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Author:
Hillcoat, Charles H.

Title:
Notes on the storage of ships

Place:
London

Date:
1919

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Hillcoat, Charles H.

Notes on the stowage of ships. A handy book upon the stowage of cargoes, with weights and measurements. New and enl. ed. By Chas. H. Hillcoat ... London, Imray, Laurie, Norie & Wilson, ltd., 1918. 1919.

2 p. l., 237, [1] p. 1 illus., 2 fold. col. plans (incl. front.) 22½cm.

1. Stowage.

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NOTES

ON THE

STOWAGE OF SHIPS

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CARGO PLAN OF

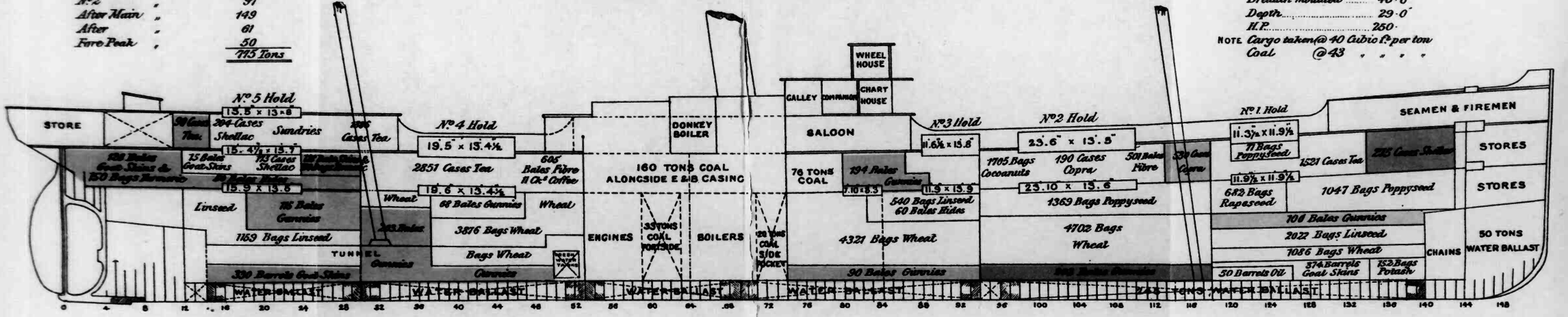
S.S. "SCOTIA."

Scale

CAPACITIES OF W.B. TANKS	TONS.
Fore Tank	245
No 1 Midship Tank	173
No 2 "	97
After Main "	149
After "	61
Fore Peak "	50
	775 Tons

Length	310'0"
Breadth moulded	40'6"
Depth	29'0"
H.P.	250

NOTE Cargo taken @ 40 Cubic ft per ton
Coal @ 43 " " "



SUMMARY OF HOLD CAPACITIES

No 1 Hold	760 Tons Cargo
No 1 Tween Deck	314 " "
No 2 Hold	841 " "
No 2 Tween Deck	332 " "
No 3 Hold	685 " "
No 3 Tween Deck	196 " "
No 4 Hold	628 " "
No 4 Tween Deck	313 " "
No 5 Hold	388 " "
No 5 Tween Deck	294 " "
Poop	310 " "
	5061 Tons Cargo

London

Antwerp to be transhipped at London

Glasgow

Official Number	96065
Gross Tonnage	2849
Nett Tonnage	1846

SUMMARY OF COAL CAPACITIES

Alongside E & B Casing	160 Tons Coal
Tween Deck Cross Bunker	76 " "
Side pockets in Boiler space	20 " "
Engine Room Bunker	33 " "
	289 Tons Coal

REDUCTION RATIO 12:1

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PM-MGP 13″x18″
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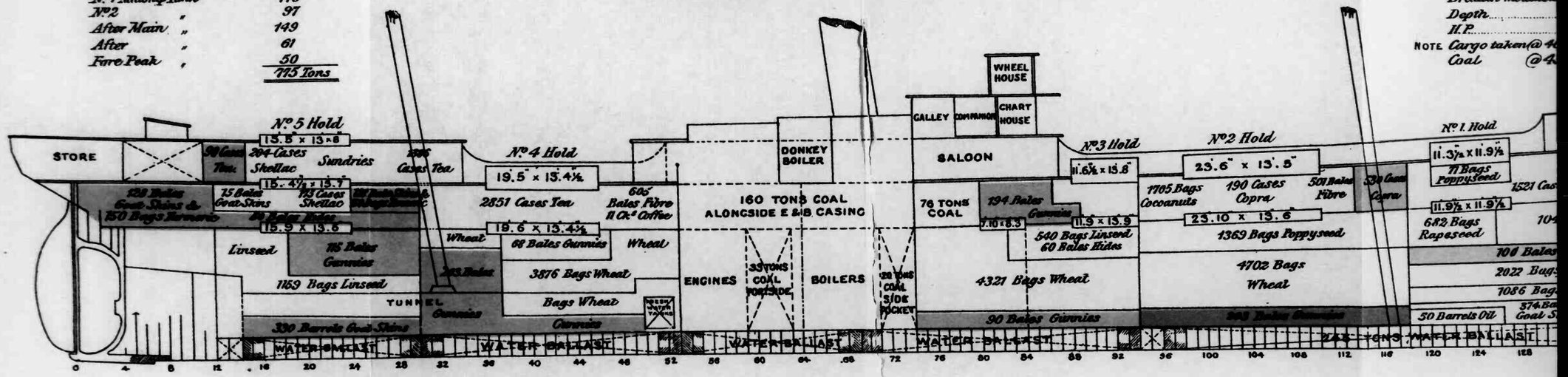
CARGO PLAN OF

S.S. "SCOTIA."

Scale 5 10 15 20 25 30 Ft.

CAPACITIES OF W.B. TANKS	TONS.
Fore Tank	245
No 1 Midship Tank	173
No 2 "	97
After Main "	149
After "	61
Fore Peak "	50
	775 Tons

Length.....
Breadth moulded.....
Depth.....
H.P.....
NOTE Cargo taken @ 4
Coal @ 4



SUMMARY OF HOLD CAPACITIES		
No 1 Hold	760 Tons	Cargo
No 1 Twen'n Deck	314 "	"
No 2 Hold	841 "	"
No 2 Tween Deck	332 "	"
No 3 Hold	685 "	"
No 3 Tween Deck	196 "	"
No 4 Hold	628 "	"
No 4 Tween Deck	313 "	"
No 5 Hold	388 "	"
No 5 Tween Deck	294 "	"
Poop	310 "	"
	5061 Tons	Cargo

London

[redacted]

Antwerp to be transhipped at London

Glasgow

Official Number.....96065
Gross Tonnage.....2849
Nett Tonnage.....1846

SUMMARY OF COAL CAPACITIES		
Alongside E & B Casing	160	Tons Coal
Tween Deck Cross Bunker	76	" "
Side pockets in Boiler space	20	" "
Engine Room Bunker	33	" "
	289	Tons Coal

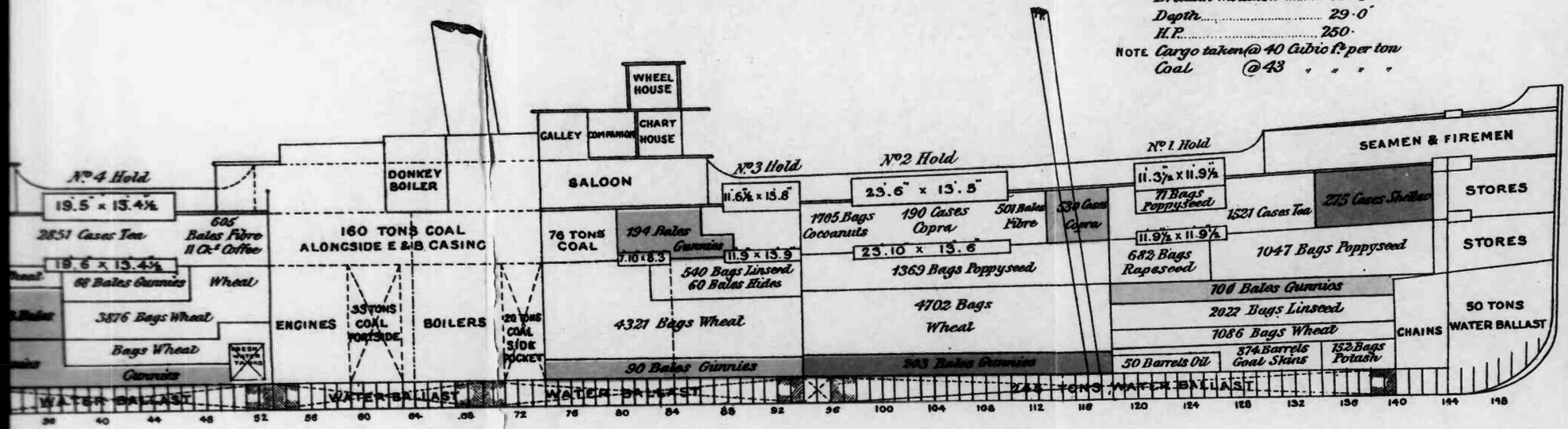
CARGO PLAN OF

S.S. "SCOTIA."

Scale

Length ..... 310'.0"
Breadth moulded ..... 40'.6"
Depth ..... 29'.0"
H.P. ..... 250.

NOTE. Cargo taken @ 40 Cubic Ft per ton
Coal @ 43 " " " "



London
New York to be transhipped at London
Antwerp to be transhipped at London
Glasgow

Official Number 96065
Gross Tonnage 2849
Nett Tonnage 1846

SUMMARY OF COAL CAPACITIES

Alongside E & B Casing	160	Tons Coal
Tween Deck Cross Bunker	76	" "
Side pockets in Boiler space	20	" "
Engine Room Bunker	33	" "
	289	Tons Coal

NOTES

ON THE

STOWAGE OF SHIPS.

A Handy Book upon the Stowage of Cargoes,
with
Weights and Measurements.

New and Enlarged Edition.

BY
Chas. H. HILLCOAT,
Master Mariner.

COLONIAL PUBLISHING COMPANY
225 WEST BROADWAY
NEW YORK
1919

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PREFACE
TO THE FIRST EDITION.

IT is nearly twenty years since the collection of these notes was begun, as I found that a thoroughly reliable, up-to-date, and handy manual on Stowage was much needed for all branches of the Merchant Navy. To make the work as complete and concise as possible, every effort has been made to include only such particulars as are absolutely essential, leaving out all unnecessary explanation and elaboration of detail, which every officer should be thoroughly acquainted with in the usual course of his business. No excuse is needed further for the production of this little work, its utility being at once apparent, and in all likelihood will be its own apology.

C. H. H.

The *Second Edition* has been entirely revised and brought up-to-date on the same concise principle as the original issue.

June, 1904.

The *Third Edition* has been carefully revised and brought up-to-date. Sufficient extracts from The Board of Trade Regulations have been inserted to give all the necessary information required of the Regulations for the carriage of Cattle, Grain, Explosives, and Dangerous Goods.

July, 1914.

STOWAGE.

ACETATE OF LIME is obtained from the Acid Liquor produced by the distillation of wood. In bags 20 cwt. stow in 80 feet. In barrels 108 feet.

ACIDS.—Most Acids contain Oxygen, and are called in consequence Oxy-acids. These again are divided into Hydrated and Anhydrous Acids, according as they contain water or not. There is, however, a second group which do not contain Oxygen; in them the element Hydrogen is always present, hence they are called Hydro-acids. The most important Acids are Hydrochloric Acid (Spirits of Salts), Hydrocyanic Acid (Prussic Acid), Nitric Acid (aqua fortis), Sulphuric Acid (Oil of Vitriol), Sulphurous Acid, Phosphoric Acid, Carbonic Acid, Acetic Acid, Citric Acid, Tartaric Acid, Oxalic Acid, etc. The most valuable of these is Sulphuric Acid, which forms the basis of our chemical manufactures. It was discovered about 400 years ago by the alchemist, Basil Valentine, and was then called Oil of Vitriol, from its oily appearance. The brown Sulphuric Acid of commerce, largely used for making manures and manufacturing aerated waters, is often shipped to different parts of the world packed in jars, which are again placed in cases and surrounded by whitening or chalk. The other kinds of acids are sometimes carried abroad packed in a similar manner. It is very important, however, that *all shipments under this heading should be considered as dangerous, and due notice of the nature and contents of such packages should be given at the time to the officers of the vessel* in which they are to be sent. It is customary to carry such cases on deck, and when securely stowed, in small quantities, they give little or no trouble or anxiety. Sometimes a case gets injured and the acid as it escapes is partly neutralised by the chalk in which it is packed; it then gives off a white vapour-like steam, but does not materially harm the others stowed round it. Such cases, if possible, should be thrown overboard at once. In doing so it is advisable not to touch the package with the hands, but to lift it on a small plank or in a sling, clear of the rail. Occasional shipments of 300 or 400 tons cases have been taken abroad. They were packed closely and well blocked off, in one of the 'tween decks, and surrounded by 20 or 30 tons of chalk or whitening. On arrival at their destination a few jars were found damaged, but other-

wise the consignment was in good order. When acids are carried on deck they should be receipted for as "On deck at shipper's risk and expense." Acids should never be stowed in the same compartment with dry or valuable goods, the fumes alone may cause serious damage to certain other articles. When cargo of this nature is carried in any quantity below the deck sufficient ventilation should be ensured before any one is allowed to go near it.

Sulphuric Acid, 4 jars in one case packed in whitening, 20 cwt. stow in 24 feet.

Sulphuric Acid, 2 jars in one case packed in whitening, 20 cwt. stow in 28 feet.

Carboys of Vitriol carried only on deck, 20 cwt. stow in 110 feet.

Sulphuric Acid shipped in Japan, packed without any chalk or whitening (*dangerous to carry*), 20 cwt. stow in 60 feet.

[*See* Dangerous Goods and Explosives.]

ALCOHOL.—A colourless liquid of burning taste and characteristic odour, very inflammable, lighter than water, and cannot be frozen. Fermented liquors contain from 10 to 50 per cent. of it, according to their strength. As a medicine, Alcoholic fluids are found useful; experience teaches, however, that to the healthy they are unnecessary. Men accustomed to hard work find they can do better without than with it. As cargo it should be treated as liquids. (*See* **Wines and Spirits.**)

Casks of Alcohol weigh 336 lbs., measure 11 feet 8 inches each. In casks, 20 cwt. stow in 80 feet.

ALE AND BEER.—When receiving cargo of this nature make sure in the first place that the packages are outwardly in good order and condition, any casks leaking, slightly broken, or having bent staves should not be received. Cases or casks which have been opened, spiled, or in the least degree marked by hammer or chisel should be either refused altogether or opened in the presence of the shippers, and the contents re-counted and examined. If you grant a clean receipt for such packages the ship must bear the expense of any shortage that may result. It is a common plan among shipping agents to try and pass off cases or casks which show signs of having been opened, with the excuse that the Custom House officers opened it to satisfy themselves before shipping, etc., etc. Such explanations, however correct, should never be relied on; in nine cases out of ten, when the goods are delivered at the port of destination, the consignee will insist on having the packages opened and examined before he receives them, and shortage will certainly have to be paid for. Native consignees in India are wonderfully expert in detecting a doubtful

package; a mark or strange nail on a case is enough to arouse suspicion; they are sure to refuse to take delivery unless opened and examined. Therefore, the only safe way is to insist on the packages being in all respects identically the same as when they left the packer's hands, free from the least mark or sign of having been opened. The consignee has then no option but to receive the goods and grant a clean receipt for them. He has only a right to examine the contents when the outside of the package or case shows the smallest indication of its having been opened in transit, without his knowledge or consent.

Barrels or hogsheads of ale should be carefully stowed with good soft wood beds, bung up and bilge free. For long voyages it is not wise to stow near large quantities of coal or sugar, as the heat or moisture may cause damage to the contents. Always stow dry goods on top of, not under, hogsheads of ale, etc. (*See* **Casks.**)

Beer will receive damage from Tar, Bales of Musk, Essential Oil, Assafœtida, Sandal Wood, or other highly scented articles, if stowed anywhere near.

Never allow the labourers to handle such packages roughly; they should not be jerked or thrown down, or the bottles will be broken. Stevedores will sometimes use such goods to block off heavy articles. This should not be allowed; use something more solid. Always have an officer, or some sober reliable person, in the hold when the men are working amongst Beer, Wine, or Spirits.

Hogsheads of beer weigh 6 cwt., measure 16 feet each.

20 cwt. of bulk Beer stow in 54 feet.

20 cwt. of casks (Bottled Beer) stow in about 80 feet.

ALOES.—Aloes have a dark resinous appearance and an exceedingly bitter taste, although free from smell. They should not be stowed among dry or valuable goods.

Lign Aloes or Eagle Wood—*Aquilaria Agallocham*—is said to be the article referred to in Scripture: it is used by the Orientals for perfuming their temples on certain festive occasions. The leaves and roots of the *Agave* or American Aloe furnish a coarse but tough fibre known as Pita Flax or Macuay. The juice of the leaves is also used as a substitute for soap, and will lather in fresh or salt water. The finest known Aloes are supposed to come from the island of Socotra. They are packed in mats, generally in small quantities of 20 lbs. each. In cases, 20 cwt. stow in about 56 feet.

ALMONDS.—

Packed variously; treat as choice freight.

Hogsheads of 770 lbs. each, 20 cwt. stow in 120 feet.

Bales of 110 lbs. each, 20 cwt. stow in 108 feet.
Cases of shelled Almonds, 20 cwt. stow in 69 feet.
Bags of shelled Almonds, 20 cwt. stow in 70 feet.

ALUM.—Alum is a colourless crystalline substance of very astringent acid taste. Largely used by dyers. It should not be stowed among dry or perishable goods, as it causes condensation and dampness, especially on long passages.

Packed in casks, cases or bundles, 20 cwt. stow in about 56 feet.

AMBER.—A hard and brittle substance, having a resinous lustre which varies in colour between a pale straw and a reddish-orange or brown; usually transparent but often clouded and opaque. The commonest kinds of amber are used to make varnish, and the more valuable kinds are employed for necklaces, pipe mouthpieces, and other purposes. The largest European Amber deposits are found on the Baltic shores of north-eastern Prussia. About 80 tons a year are dug up there, and the supply appears practically inexhaustible. To be treated as valuable cargo and safely stowed under lock and key. Packed generally in cases of various sizes.

AMBERGRIS.—Usually called Grey Amber, a morbid secretion of the sperm whale, is found floating on the sea, and on the shores of some countries. It has a peculiar, sweet, earthy odour, and is employed as a perfume. Being a valuable article, it should be carefully looked after.

AMBOYNA WOOD.—A valuable wood obtained from the Spice Islands, and used for inlaying, etc. It may be used as broken stowage or as dunnage for dry cargoes. 20 cwt. stow in 50 feet.

ANCHORS AND CHAINS, Etc.—For Steam Vessels and Sailing Vessels. *See* Tables at end of the book.

AMMUNITION.—AMBERITE.—*See* **Gunpowder.**

[*See* Appendix relating to the Carriage of Dangerous Goods, etc.]

ANISEED.—A light seed in bags. 20 cwt. stow in 120 feet.

ANISEED OIL.—In tins and cases. Weight, 70 lbs., measure 13 ins. × 18 ins. × 35 ins. equal 5 cubic feet. (*See* **Oil—Essential Oil.**)

ANTIMONY ORE.—In receiving as cargo be careful that the bags are in good condition and not full of holes or perished, as they often are. Usually shipped in bags of 132 lbs each. 20 cwt. stow in about 20 feet, sometimes less.

APPLES.—Barrels of American Apples are generally stowed in the 'tween decks, bilge-and-cantline, other light goods being used to choke them off. Care should be taken to give plenty of ventilation.

Be careful to put beds under the lower tiers. Barrels of Green Apples average from 145 lbs. to 155 lbs., measure 6 ft. 6 ins. each. Barrels of Dried Apples weigh 138 lbs. to 170 lbs., and measure 6 ft. 10 ins. each. Boxes of Evaporated Apples weigh 50 lbs., measure 7 ft. 6 ins. each.

One ton of 20 cwt. stows in about 90 feet.

APOTHECARY WARE.—To prevent any unforeseen difficulty or damage to other goods, it is always advisable to clearly ascertain the nature of any package shipped under this heading, and to stow them accordingly.

APRICOTS (Preserved).—Stow as dry goods if the contents are in tins. Boxes generally contain 2 dozen tins of 2½ lbs. each and weigh 67 lbs. to 70 lbs., measurement 1 ft. 6 ins. to 1 ft. 7 ins. each.

Cases of Apricots, 20 cwt. stow in about 50 c.f.

Cases of Apricot Pulp, 20 cwt. stow in 55 feet.

ARECA NUT.—Well known in the East as the "Betel Nut." Natives use it mixed with pan leaf and chunam or lime as a masticator. It has the effect of dyeing the teeth and lips of the native women a bright crimson, and is considered to impart a fragrance to the breath. When green and shipped in baskets and bags on long passages, it often causes damage to other articles in the hold by its heating properties; it also *gives off a dangerous gas, fatal to animal life.* Give plenty of ventilation in stowing, and keep the hatches off as much as possible on the voyage. Bags usually run 100 lbs. each.

One ton of 20 cwt. stows in about 60 feet.

ARNOTTO, ANNATTO.—Used for dyeing purposes. If in casks pickled should be treated as moist cargo.

Casks weigh 2½ cwt. each.

ARRACK.—A distilled liquor used in the East. The fermented juice or sap extracted from the palm tree is called Toddy, and Arrack is distilled from it. Casks or kegs should be stowed the same as Brandy, Whisky, etc.

One ton, 20 cwt. in bottles and cases, stows in about 75 feet.

ARROWROOT.—This name is applied to the produce of various plants from which a pure kind of starch is obtained; being very digestible and nutritious it is largely used for dietary purposes. In stowing it should be treated as dry goods, and kept free from smells and dampness.

Shipped in bags, boxes, barrels, or cases, sometimes in tins.

One ton of 20 cwt. in boxes stows in about 70 feet.

One ton of 20 cwt. in bags stows in about 52 feet.

ARSENIC.—A brittle crystalline substance of steel-grey colour possessing considerable metallic lustre. It occurs sometimes in the free state, but more frequently in combination with sulphur and the metals usually called arsenical metals. The compounds of arsenic are dangerous to animal life.

It should not be stowed near articles of an edible nature.

One ton of 20 cwt. in cases stows in 22 feet.

ASBESTOS.—A fibrous incombustible mineral shipped in casks or cases, sometimes in bales. When clean has no objectionable qualities, and can be stowed as desired. Cases of Asbestos Packing weigh 261 lbs. and measure 6 ft. 2 ins. each.

20 cwt. in cases should stow in 53 feet.

ASHES.—Pearl, Pot and Bone Ash, whether in packages or bulk, should be kept perfectly dry and away from moist articles. Casks weigh about 4 cwt. each.

20 cwt. should stow in 53 feet, some sorts 45 feet.

ASPHALTE.—STEVENS ON STOWAGE says:—"The brig 'MIGNONETTE,' of 182 tons register, loaded 250 tons Trinidad Asphalte when she was nearly two-thirds full. In her case spars were laid athwartships, planks laid against them, and a quantity of branch wood 5 or 6 feet long was fixed to the plank, well whitewashed to prevent sticking; she had also fore-and-aft shifting boards, rising 4 feet from the surface, to keep the cargo from shifting. The brig arrived safely at Havre; the Asphalte was dug out of the hold with difficulty. With 250 tons of Patagonian Guano she was two-thirds full."

20 cwt. or one ton of Asphalte should stow in 17 feet.

ASSAFŒTIDA.—Used as a medicine and shipped from the Persian Gulf and other Eastern parts in bags and boxes, often in skins and baskets. It has a sickly odour and an unpleasant taste. The smell will sometimes remain after the stuff has been discharged. Care should be taken not to stow it near provisions or cargo liable to damage.

Shipped in bags of about 145 lbs. each.

20 cwt. stow in 50 feet, when in cases about 40 feet.

ATTAR, OR OTTO OF ROSES.—*See* **Essential Oils.**

AVERAGE.—All loss which arises in consequence of extraordinary sacrifices made, or expenses incurred for the preservation of the ship and cargo, comes within *General Average*, and must be borne proportionately by all who are interested. In other words, it is a loss incurred for the general benefit of the ship and cargo, to which those who have received the benefit are by law liable to contribute rateably.

Particular Average is a loss arising from damage accidentally and proximately caused by the perils insured against.

BACON AND HAMS should be stowed in a cool part of the vessel, and separated from heavy goods. Sides of Bacon are sometimes shipped packed in coarse sacking only; extra care is then required to prevent damage from outside pressure. Such articles should not be used for blocking off rough cargo.

Average weight of hogsheads of Bacon 1,452 lbs., measurement 35 ft. 11 ins. each. Boxes of Bacon 540 lbs. to 600 lbs. each measure 15 ft. 6 ins. to 17 ft. 2 ins. each.

One ton of 2,240 lbs. stows in about 66 feet.

Barrels of Smoked Hams 381 lbs. to 398 lbs. measure 11 ft. 3 ins. to 11 ft. 7 ins. 20 cwt. stow in about 70 feet.

BAGGAGE.—Under this heading should be included packages not manifested as cargo or stores on board a vessel. The work of receiving and delivering it devolves upon the junior officers or upon some other person duly appointed for the purpose. He should when receiving have all the heavy articles struck below at once, those "not wanted on the voyage" first, over which can be stowed those "wanted." The light packages should on no account be put under the heavy ones. By most Companies there are printed labels issued to passengers with their tickets, and it is advisable for them to see their goods so labelled before being shipped. The words "wanted" or "not wanted on the voyage" should be pasted or printed on a prominent part, so as to be easily seen. Heavy baggage is usually got up once a week on long voyages, to enable passengers to get out what clothes they require. It should be sent alongside the vessel at least one clear day before sailing, to allow time for stowing.

CUSTOMS.

PASSENGERS' UNCONSUMED STORES

The following quantities of cigars, manufactured tobacco, and spirits may be passed by the Officers free of duty, in the case of passengers arriving from places other than the Channel Islands, provided the articles are duly produced by the passengers and are not found concealed, viz.:—

Cigars and Manufactured Tobacco. Any quantity not exceeding half a pound weight.
Ordinary drinkable Spirits. Any quantity not exceeding half a pint.
Cordials or Perfumed Spirits. Any quantity not exceeding half a pint.

Passengers from the Channel Islands are only allowed one half of the above quantities.

CUSTOMS DUTIES (1914).

	£ s. d.	£ s. d.	
Tobacco in leaf	0 3 8	to 0 4 1	per lb.
Do. Manufactnred ...	0 4 8	to 0 5 4	,,
Cigars	0 7 0		
Cigarettes	0 5 8		
Wines (up to 42° proof spirits) ...	0 1 0	to 0 3 0	per gallon.
Perfumed Spirits	1 4 1	to 1 5 1	,,
Spirits	0 15 1	to 0 16 3	,,
Liqueurs	0 15 2	to 1 5 1	,,
Tea	0 0 5	per lb.	
Coffee	0 0 2	,,	
Cocoa	0 0 1	,,	

Tobacco, Cigars, Cigarettes, etc., not to exceed 3 lbs. from ports on the Continent of Europe outside Gibraltar, and 7 lbs. from other places; up to 20 lbs. if for private use. Can be landed on payment of duty, and in addition a fine of 3d. per lb. on unmanufactured tobacco, 6d. per lb. on Cigars, etc., and 1/- per lb. on Cavendish and Negrohead tobacco.

Exceeding 20 lbs. net weight in Baggage.—Application in writing to be made by passenger, or his agent, to the Collector or other Officer in charge of a port or Station Surveyor who may allow delivery upon being satisfied that the importation is bonâ fide, for the private use of the passenger, and upon his certifying to that effect upon the application.

Explosives in Baggage.—Importation is prohibited, except Safety Cartridges for private use.

The duties upon Tobacco and Spirits vary somewhat, according to description and strength, and there is an additional charge of 1/- per gallon on Still Wines in bottle, and 2/6 on Sparkling Wines.

The following are prohibited:—False Money, Saccharine, Extracts of Coffee, Chicory, Tea, Malt, or Tobacco; Tobacco Stalks stripped of the leaf, and Tobacco Stalk, Copyright Books reprinted abroad, articles with marks or names imitating those of British manufacturers, etc.

In the United States and Great Britain new and stringent rules have been adopted by the Customs' authorities in relation to the examination of passengers' effects. Formerly, when luggage arrived unaccompanied, it was merely detained until the owner or his agent could attend with the keys of the packages. Now, however, the examination, instead of being the matter of form to which travellers have been accustomed, is conducted in a searching manner, every package being thoroughly overhauled.

Upon landing at Continental ports, and in passing the various frontiers, there is often an examination of baggage, even though

registered through; it is advisable always to declare any article believed to be liable to duty; it should be remembered also that every Custom House Officer can search a person if he chooses. On the Continent dutiable goods, packed with articles of apparel, or otherwise concealed, are, as well as the articles in which they may be placed, liable to seizure; travellers are warned that the seizure is strictly enforced unless the examining officer is informed of the articles being in the package, and the goods duly declared previously to its being opened.

Weight.—Passengers are allowed the following amount of baggage free of charge.

	P. & O.	*B. I.*	*Orient.*	*Wh. Star.*	*Cunard.*	*Clan.*	*N. Y. K.*
1st Class...	336 lbs.	336 lbs.	40 c.f.	20 c.f.	20 ft.	40 ft.	40 ft.
2nd ,, ...	168 lbs.	168 lbs.	20 c.f.	20 c.f.	20 ft.	20 ft.	20 ft.
Children ...	Half.	Half.	Half.	Half.	Half.	Half.	Half.
Extra baggage per 112 lbs. 10/-	...	...	...	...	...	...	...
Per cubic foot ...	1/-	2/6	1/-	1/-	1/-	1/-	1/-

Insurance.—When desired, baggage can be insured at about the following rates:—

Mediterranean and Suez	10/- to 15/- per £100.
India	20/- per £100.
Australia, China, and Japan ...	25/- to 30/- per £100.
New York, or other American ports ...	10/- to 15/- per £100.

Jewellery, Plate, Etc.—Passengers' baggage must contain only their personal effects. If there should be any jewellery, plate or valuables, they may be specially declared and insured, and freight paid on them.

Packages containing goods of a dangerous nature, or liquids, should not be shipped as personal luggage. Any infringement of this rule renders the passenger liable by law to fine and imprisonment, and also for any damage to other goods.

BALE GOODS, OR FINE GOODS.—Shipped from all parts of the world, vary in size and weight as in value. Some descriptions sent from Manchester to Red Sea ports average quite one ton each. The stowage of fine goods requires time and attention. It is not an unusual thing to find two or three thousand tons shipped in about the time it would take to load as much coal. Goods of this description tumbled into their places, and blocked off with anything that comes to hand, cannot be considered as properly stowed.

When at sea, and subject to the continued motion of the vessel,

they destroy one another. Steam vessels have a vibration day and night when under weigh, known as *panting*. Goods, unless well stowed, are consequently rubbing against each other even in calm weather. Hooks should not be used by the stevedore's men whilst working bale goods. Never allow a bale to be hoisted in or out of its place by case hooks. Avoid the use of the crowbar as much as possible. Do not work or drag bales over rough articles such as machinery or railway iron, etc. The stowage of cases and bales together is a fruitful source of damage, and in such instances, cases with iron hoops are often rolled over a platform made with bales without any protection in the form of planks, tarpaulins, or mats between. Under such treatment the injury done to the bales has been known to cost more than the freight obtained on the goods damaged. Consignees, especially in the East, expect to receive packages identically the same as when they leave the hands of the packer, consequently they make no allowance for wear and tear, but claim for the most trifling damage. Unfortunately it has become the custom in most ports to allow for these chafings. Scratches which a ship's officer would never notice in the ordinary way when receiving the cargo are sure to be allowed for, especially if the contents of the bale be exposed. Bales of shirtings should be stowed on their edges in the wings, and flat amidships. Be careful with mats and dunnage, especially in the wings. Good bamboo mats are often used between bales and iron, and seem to answer on flat surfaces.

20 cwt. of Bale Goods well pressed will stow in 48 feet, but they vary much according to the articles shipped.

Bales of Ducks ... ... 20 cwt. should stow in 47 feet.
Bales of Domestics ... 20 cwt. should stow in 70 feet.
Bales of Canvas ... ... 20 cwt. should stow in 42 to 45 feet.

BALLAST.—The amount of stiffening required to make a vessel perfectly safe at sea should be a subject of careful study and consideration to both master and officers. Unfortunately no hard and fast rule can be laid down for their guidance; the stability of the ship and the nature of any cargo to be carried can alone give a satisfactory conclusion. A vessel, especially a flat-bottomed one, may appear perfectly stiff and safe in fine weather, which would be dangerously tender in a sea-way.

Water ballast seems destined ultimately to become general on large iron vessels. Tanks in the bottom, however, have certain elements of danger which, unless studied and understood, may lead to most disastrous results. In using ordinary kinds of ballast, stone is

safer than sand or rubbish; hard flinty ones can sometimes be re-sold in large towns for road metal. Where stones cannot be obtained in sufficient quantities sand may be used with greater safety by making a platform of the former, thereby raising the sand several feet from the bottom of the vessel.

Before taking in ballast liable to run, such as sand, it is necessary to provide against its getting into the limbers and choking the pumps.

This precaution should never be neglected. With tea cargoes, Chinese stevedores prefer shingle or small stone ballast, it being the easiest to work.

When loading or discharging ballast into boats, it is required in most ports to have a tarpaulin hung out to prevent any falling overboard. The neglect of this precaution may lead to a fine.

"Blue Billy" appears to be a species of quicklime refuse obtained from gas works, and charged with inflammable impurities. In one instance this stuff was covered with other ballast; the heat being unable to escape, the vessel caught fire, and very serious damage resulted. Certain red marl and stones, shipped at Bristol as dry rubble ballast, have been ascertained to be largely soluble in water. In a reported case in which a vessel sprang a leak, it dissolved and choked the pumps, thus materially contributing to her loss. A species of mud ballast in use at Dublin also appears to be of an objectionable nature.

The master of a vessel having instructions from her owners to purchase ballast in a foreign port, no mention being made of the price per ton, it was held that having purchased rubble sand and old building material, when better stuff could have been obtained at a higher rate, the ultimate loss of the vessel was in a great measure due to his default, and the Court suspended his certificate in consequence.

"EARNMOOR," S.S. built at Yarrow, 1887, owned by Earnmoor Steamship Company, Limited, tonnage, 1,319, Baltimore to Rio with wheat, went on her beam ends and foundered in lat. 25° N., long. 70° W., September 5th, 1889, whereby nineteen lives were lost. Inquiry held at London, January 16th, 1890, before Cunninghame Inspector. Loss caused by vessel not having sufficient stability owing to her empty ballast tanks, which contained 11,620 cubic feet of air space.

Damp or wet sand, also inferior kind of rubbish, will often damage cargo of a dry nature, if stowed over without being separated by planks.

20 cwt. or one ton of Sand stows in 19 cubic feet; coarse Sand one ton in 20 feet.

20 cwt. or one ton Shingle Ballast stows in about 22 cubic feet.
20 cwt. of Loose Earth in 24 feet.
20 cwt. of Clay stow in 24 feet.
20 cwt. of Clay with Gravel in 18 feet.

BALSAM COPIVI.—An Oil having a most nauseous taste and odour. It should never be stowed amongst articles liable to be damaged by contact, especially those of an edible nature.

In small kegs, 20 cwt. stow in 60 feet.

BAMBOOS AND RATTANS should not be used for dunnage unless shipped for the purpose. Claims have often been made against shipowners for damage to bamboos by heavy cargo having been stowed over them. Light bamboo used as dunnage will split and give way under undue pressure. It is, however, an excellent protection for the sides, especially with grain cargoes. (*See* **Rice**, and **Dunnage**.)

The male bamboo, if new, is an exception to this rule, it being strong and not easily broken.

BANANAS, PINEAPPLES, PLANTAINS, etc., are shipped green by steamers from the West Indies and Atlantic Islands. The holds of vessels are fitted with racks supported by stanchions. They form shelves or platforms, the extreme length of the holds, with a passage way down the centre. The bunches of fruit are then stowed with a portion of their foliage on in layers according to their size and weight, care being taken not to overload the lower tiers, or they will go bad. Ventilate as for fruit.

BARILLA is an alkali obtained by the combustion of Plants, etc. 20 cwt. stow in 40 feet.

BARJARI.—An Indian pulse. 20 cwt. in bags stow in 54 feet.

BARK.—This article may generally be stowed with dry goods when free from smell or objectionable qualities. Care should be taken to keep the finer kinds away from oily, damp, or strong-smelling articles, as they may be damaged by contact. Peruvian Bark, sewn up in dry hides, must have careful stowage.

New York bags average 113 to 134 lbs., and measure 6 ft. 3 ins.

Bales measure 8 ft. 9 ins., casks about 32 ft. 7 ins.

Hogsheads weigh 2,148 to 2,653 lbs., measure 72 ft. 3 ins. to 78 ft. 2 ins. each.

Hogsheads—One ton (20 cwt.) of Tree Bark stows in 75 feet to 85 feet. One ton (20 cwt.) bags of Coppice stows in about 100 feet.

Oak Bark from the Mediterranean shipped in bags of 100 lbs. each. 20 cwt. stow in about 54 feet.

BECHE-DE-MER.—The bêche-de-mer, trepang, or sea-slug, as it is variously called, consists of eight or ten marketable varieties, from the small white fish, worth £17 a ton, to the large teat fish which realises £120 per ton. It lives among the sea grasses on the coral reefs in the Pacific Ocean. In appearance when first caught they are of an oval shape, dark coloured on the back, and vary in length from 6 to 24 inches. Considerable care must be given to the operation of curing them, which is performed by cleaning and boiling over a fire. They are then dressed either on a perforated wire stage over a fire, or in the sun. When thoroughly cured they are as crisp and brittle as dry glue, but after lying in sacks any length of time become soft like india-rubber. A man smart at his work can cram 20 cwt. into 14 corn sacks, after which they are marked and ready for shipment. China absorbs the bulk of this product. In stowing large quantities below, it must be remembered that, however dry, there is often a disagreeable odour given off, which might damage other goods.

BEANS.—Haricot beans in bags. 20 cwt. stows in 68 feet.

Barrels of Beans average 258 lbs. each, measure 7 ft. 11 ins.

(Alexandria) in bulk. 20 cwt. stow in 47 feet.

BEEF AND PORK.—Stow as moist cargo and apart from dry goods. (*See* **Casks.**)

Tierces of American Salt Beef usually measure 11 ft., and weigh about 504 lbs., and contain 304 lbs. of beef.

Barrels measure 7 ft. 8 ins., and weigh 360 lbs. each.

Half Barrels measure 5 feet, and weigh 216 lbs. each.

Tierces of Buttocks measure 11 feet, and weigh 491 lbs. each.

Barrels of Pork measure 7 ft. 5 ins., weigh from 320 to 360 lbs., average 340 lbs., and contain 200 lbs. of pork.

Tierces of Beef Fat weigh from 385 lbs. to 491 lbs., and measure 10 ft. 8 ins. to 11 ft. 2 ins. each.

One ton (2,240 lbs.) Pork or Buttocks stows in about 50 feet.

One ton of 20 cwt. Tierces of Beef stows in 52 feet. Barrels of Bladders weigh 350 lbs., measure 7 ft. 5 ins. each. (*See* **Corned Beef.**)

BENZINE.—A highly inflammable and dangerous article. On one occasion, in a basketful of bottles containing benzine, one was broken, and the inflammable stuff ran down the deck coal-spout into the engine-room; a volume of smoke shot up instantly as high as the top of the funnel, and one of the paddle-boxes, the smoking-room on deck, and the conductor's room, with all his papers, were soon destroyed. The steamer was almost reduced to a wreck.

(*See* **Naphtha**, and **Dangerous Goods.**)

BEESWAX, etc.—Packages containing this article are seldom uniform either in size or weight. Care should be taken to note on the receipt and B. L. any objectionable feature, such as old second-hand casks, or kerosine tins, that may have been used for packing, otherwise the expense of repairing may fall on the ship. Excessive heat will cause wax to melt and thereby endanger other articles stowed near; with this exception it has no objectionable quality, and may be stowed as desired.

American cases weigh about 293 lbs., measure about 9 feet.
Small cases about 150 lbs., and measure about 5 ft. 2 ins. each.
Barrels weigh from 378 to 385 lbs., measure about 11 to 12 feet each.
Barrels weigh about 290 lbs., and measure 9 ft. 2 ins. each.
When 7 barrels equal one ton, they generally stow in about 65 feet.

BETEL NUT.—*See* **Areca Nut.**

BILLS OF HEALTH.—Consuls resident in foreign ports are authorised to issue and endorse Bills of Health, and state on such documents the existence of any pest or plague, such as Cholera, etc., at the time prevailing. He can also at the request of the master grant certain certificates regarding the cargo shipped at his port. Such documents must be delivered over by the master to the Quarantine or Medical Officer at the port of destination. (*See* **Quarantine.**)

BILLS OF LADING.—There are few things connected with the shipping of cargo which require closer attention than the signing of Bills of Lading. Before signing read them carefully, and if in Great Britain see that they are stamped (for signing an unstamped one a master is liable to a penalty of £50). Do not on any account sign until the cargo has been shipped; many do so when the goods are alongside, but there is no saying what may happen during the time they are left there, and the master is held responsible if he has signed beforehand. A letter of indemnification is not looked upon as of any value should anything go wrong. When Bills are presented for signature, stating that the packages contain certain quantities, or stating in what condition they are, it is always wise to insert the words "SAID TO BE."

In the event of getting permission to open packages for convenience of stowage, or if found necessary to stow on deck, be sure that such permit is included in the agreement.

Make sure that the entries in the cargo book coincide with the Bills of Lading, and remember that in the case of *written* and *printed* bills the former have the preference in a Court of Law should any difference crop up. See that Bills of Lading are produced by all to whom cargo is delivered. As the master is responsible for all signatures, he should make a point of getting all Bills of Lading verified before sailing.

A Bill of Lading by which goods are made deliverable to the consignees, "they paying for the goods as per charter-party," does not make consignees liable for demurrage incurred at the loading port. If the master claims any rights of lien on the cargo for freight, demurrage, or dead-freight, the same must be clearly stated in the Bill of Lading. If there is a claim on account of detention beyond the demurrage days, that also should be stated. (*See* **Receipts.**)

BITUMEN comprises a wide range of inflammable mineral and tarry substances. (*See* **Pitch, Tar, Asphalte, etc.**)

BLACKING.—Cases containing this article in tins weigh from 69 lbs. to 75 lbs., and measure 1 ft. 4 ins. each.
Crates measure 4 ft. 2 ins., barrels 11 ft. 11 ins. each.

BLACKING MOULDERS.—Average 36 cwt. each, and measure 64 feet each.

BLACK LEAD.—PLUMBAGO or GRAPHITE. Generally shipped in casks. The dust escaping through the staves when working or rolling this kind of cargo causes damage to other goods. It is said to be liable to spontaneous combustion if stowed with Oil on long voyages. (*See* **Plumbago.**)

BLACKWOOD.—A hard-grained but brittle wood. 20 cwt. stow in about 65 feet.

BLACKWOOD WARE.—Japan and China, in cases measuring from 10 to 18 feet. Weight and value vary. Stow among dry goods only.

BLADDERS.—In barrels, average size 2 ft. 5 ins. by 1 ft. 9 ins. by 1 ft. 9 ins. equals 7 ft. 5 ins., weight 350 lbs. each. Stow the same as Beef or Pork.

BLEACHING POWDER.—Chlorides of lime, soda, and potash, and their solutions yield chlorine spontaneously. They have a strong odour of gas and powerful bleaching properties. Shipped in jars, cases, or casks, they should never be stowed near dry or choice cargo; by the vapour alone bale goods will become damaged if stowed in the same hold. The staves of casks used for this powder will often rot in a single passage, and the cost of repacking may fall on the ship. (*See* **Chloride of Lime.**)

One ton or 20 cwt. in cases stows in 80 feet.

BLUE BILLY.—*See* **Ballast.**

BLUE LIGHTS.—*See* **Explosives.**

BONES, AND BONE MEAL.—Before receiving loose bones, either for broken stowage or dunnage, it should be ascertained that they are perfectly dry and comparatively sweet, otherwise damage may result from excessive heating, or the odour may injure such goods as wheat, rice, flour, etc., and cause them to mildew. This article often turns out short on delivery. It is, therefore, necessary in granting a receipt for loose bones to state *about* so many tons ; do not name a fixed amount if you can avoid doing so.

Bone meal has sometimes a slight odour, and also creates a great dust over articles stowed around, especially when worked in or out in any quantity. Being heavier than most articles shipped in bags, it is generally taken in the first and discharged the last. Ships are often made to pay for loss arising from the use of second-hand, old and inferior bags. All marks should be clear and distinct; superfluous ones should not be allowed on any condition, as they lead to disputes when discharging at the port of destination. Bags used for bone meal dry up and rot very quickly.

Bone ash should be kept perfectly dry, or it will be liable to spontaneous combustion.

Bone meal stows 20 cwt. in about 45 cubic feet.

Crushed bones 20 cwt. in 60 cubic feet.

One ton of loose bones stows in about 85 cubic feet.

One ton, 20 cwt., of calcined bones in bulk stows in 106 feet.

One ton, 20 cwt., of common bone manure stows in about 72 feet ; best 53 feet.

BOOKS, PAPERS, STATIONERY, etc.—Usually packed in tin-lined cases. Should be carefully stowed among dry goods only.

Cases of paper measure about 4 ft. 1 in. each.

Cases of pencils from 19 ft. 11 ins. to 24 feet each.

Cases containing books, measuring 36 ins. by 18 ins. by 18 ins., weigh 310 lbs.

BOOTS AND SHOES.—In trunks and cases; weight, etc., various and uncertain.

BORACIC ACID.—In casks, 20 cwt. stow in 64 feet.

BORAX, OR TINCAL.—A colourless crystalline compound of boracic acid and soda. As it reaches this country, Californian borax, after being freed from its earthy elements at the Borax Lake, is put up in small bags, and consists of pure white crystals, which are crushed into a fine, white, almost impalpable powder in the factories. After undergoing various processes, it comes out eventually to the outside world as borax extract of soap, borax dry soap, washing powders, etc. This prepared Californian borax is used in

the laundry, for washing cattle, helping to heal wounds, and many other purposes. Its virtues in preventing decomposition in hams and salted meats are also well known. Water containing one per cent. of borax will keep sweet for years, and remain safe for drinking.

The soap prepared with borax, however, has been thought by some to have a more corrosive influence on fibres than common soap. In Belgium, powdered borax is used for washing purposes, with a view to economise soap ; while in Sweden, meat and milk are largely preserved by means of boracic acid, its use in no way rendering these viands less wholesome. It is also valuable for hard soldering, and is in use for pottery glazes and enamels.

In addition to the natural supply of crude borax already mentioned, this substance is largely made from boracic or boric acid, found among the matters ejected around the craters of volcanoes. Works for utilising and preparing it exist in the Maremma of Tuscany, where the acid is condensed from the boiling springs and heated gases issuing from fissures in the rocks. It is also found in Central Asia, Canada, Peru, and in Nevada, United States.

In bags. 20 cwt. stow in about 42 feet (variable).

BORATE OF LIME is much lighter than coal, and little over half the weight of nitrate of soda. It is not so susceptible of injury by dampness as nitrate. 20 cwt. stow in about 52 feet.

BOTTLES.—In crates 20 cwt. empty bottles stow in 85 feet.

BOUSSIR is a dust from rice exported principally from Rice Ports. This being a light, dry article, it can be stowed among dry goods. 20 cwt. in bags stow in about 60 feet.

BOXWOOD.—A close-grain wood. 20 cwt. stow in about 65 feet to 70 feet.

BRAN.—The British Admiralty allows 48 bushels to one ton.

American bags average 140 lbs. to 164 lbs. each, measure about 8 feet. 20 lbs. Wheat Bran to the bushel in New York.

Bales compressed Bran about 200 lbs. measure about six feet.

One ton or 20 cwt. Bran in bags stows in about 110 to 140 feet.

One ton or 20 cwt. compressed bales stows in about 80 feet.

BRANDY is considered proof by the Custom House authorities if containing 50 per cent. of alcohol, when the temperature is 51° Fahrenheit. It weighs twelve-thirteenths of an equal quantity of distilled water. Brandies and other spirits for abroad are generally in hogsheads and quarter casks, or packed in straw in cases contain-

ing one dozen or more bottles each. Casks weigh 336 lbs., measure 11 ft. 6 ins. each.

20 cwt. in casks stow in about 80 feet.

Cases containing bottles, 20 cwt. stow in 52 to 60 feet.

BREAD OR BISCUITS.—Care should be taken not to stow bread on or near cordage. It readily becomes impregnated with the fumes of turpentine or tar. The scent from camphor will make bread unfit for use. If stowed in a clean lime-washed iron tank, and the lid made air-tight, it will keep good for years. In bags 20 cwt. should stow in about 140 feet. 20 cwt. in casks about 160 feet.

In cases, as shipped from Mediterranean ports, 20 cwt. stow in about 156 feet.

BROKEN STOWAGE, BEAM FITTINGS, etc.—When loading a full and complete cargo, it is the duty of the officers and stevedore to select certain articles for broken stowage. Care should be taken in choosing such goods, to ascertain that they are of inferior value and in every way suitable for stowing in out-of-the-way corners where broken stowage is required. Sometimes vessels are provided with broken stowage when loading, shipped at a reduced rate of freight. When this is the case, always begin by getting 5 or 10 tons on board in a convenient place, and insist on its being used and replenished as required. Vessels will stow 5 or 6 per cent. more cargo in many instances if well provided with suitable broken stowage. Unless such articles are, however, actually used for the purpose for which they are shipped the vessel is better without them. They are only shipped to go where other goods will not stow.

BROOM HANDLES—Shipped in cases, measuring about 22 ft. 5 ins. each.

BRIDGE WORK (Iron).—Measures usually from about one half to little over a half of its weight. (*See* **General Cargo.**)

BRICKS.—The ordinary brick is said to be capable of absorbing one-fifteenth of its weight of moisture, consequently small, heavily-laden vessels should provide against the evil effect of such a contingency. In bad weather any water getting below might cause serious trouble.

About 300 fire-bricks or 370 common bricks weigh about 20 cwt. 20 cwt. of bricks stow in 20 feet.

Cases of fire-bricks weigh from 7 to 10 cwt. and measure 15 ft. 7 ins. to 16 feet each.

500 fire-bricks one load. 1,000 tiles one load.

1,000 bricks well stowed require about 75 cubic feet when new. 1,000 old bricks about 68 to 70 cubic feet.

BRAZIL NUTS.—The fruit of a tree. The seeds called nuts are enclosed within a hard woody capsule forming a ball larger than an orange. Besides being consumed for food they yield a pleasant nutty oil much used in cooking.

Barrels of Brazil Nuts measuring 2 ft. 4 ins. by 2 ft. 8 ins. by 1 ft. 8 ins. measure about 6 ft. 6 ins., and weigh 160 lbs.; 20 cwt. stow in about 90 feet.

BRAZIL WOOD.—*See* **Woods.**

BRIMSTONE.—*See* **Sulphur.**

BRISTLES.—Hairs obtained chiefly from the backs of swine. Packed in barrels of 10 cwt. 20 cwt. in casks stow in about 96 feet.

Bristles for China, packed in cases, measuring 4 ft. 6 ins., generally weigh 1 picul nett.

No. 1—$ 250.
No. 2—$ 125-150.
No. 3—$ 50.

BULBS.—A vegetable root shipped in considerable quantities. Cases should be carefully handled, and stowed in a dry cool part. 20 cwt. stow in 80 feet.

BULLION.—*See* **Gold, etc.**

BUTTER.—Packages containing this article are generally sufficiently strong to carry the contents with safety, but, when roughly handled, or if heavy articles are stowed upon them, they are liable to give way and cause trouble. The coolest part of the ship should always be preferred for goods of a greasy nature. It is hardly necessary to point out the advisability of keeping such articles by themselves, and away from anything liable to damage by contact.

Turpentine, Tar, Oily Ropes, Bones, or other smelling articles will destroy the value of butter if stowed in the same hold.

Kegs of butter weigh 63 to 70 lbs. and measure 1 ft. 10 ins. each.

Tubs of butter 73 to 85 lbs. measure 2 ft. 1 in. each.

Firkins of butter 112 to 120 lbs. measure 3 ft. 3 ins. each.

Cases containing tins of butter measure 4 ft. 1 in. each.

Cases of Irish butter, 8 tins of 14 lbs. each, weigh 130 to 140 lbs., and measure 35 ins. by 17 ins. by 12 ins. each.

One ton (2,240 lbs.) stows in 70 cubic feet.

CAMPHINE.—Camphine, Oil of Turpentine rectified by redistillation with potash and water, is highly inflammable. It has such a powerful odour that it is difficult to get rid of it when the stuff has been discharged. It should not be carried below excepting under special conditions. Under no circumstances should lights be allowed near when working at or receiving it on board.

CAMPHOR.—Shipped in casks, cases, or drums. Sometimes the covering is very light and the cases badly lined. A small parcel stowed in the hold will damage a whole cargo of tea, sugar, flour, or any food-stuffs.

Camphor wood boxes, or planks, have been known to damage shipments of tea, coffee, etc., even in a short passage.

Care should be taken in carrying Camphor to stow in a part of the vessel where it will be perfectly dry and not liable to damage other goods.

Camphor from China ports, packed in wooden cases, 4 feet to 6 feet, shipped to Calcutta, Bombay, London and Germany; nett weight 95 catties to 1 picul per case. Special stowage required. Value $40 to $50 p. picul (133 lbs.).

20 cwt. in cases stow in about 68 feet.

CAMWOOD.—A red dye wood, principally obtained from the vicinity of Sierra Leone, where it is known as Kambi.

One ton of 20 cwt. stows in about 80 feet.

CANARY SEED.—In bags, 20 cwt. stow in about 58 feet.

CANDIED FRUIT.—Choice freight, and generally shipped from French ports.

In cases 20 cwt. stow in 80 feet.

CANADA BALSAM.—A turpentine obtained by incision of the Balm of Gilead fir tree, United States and Canada. Shipped in barrels containing about 112 lbs. each. It is an oleo-resin of pale yellow colour, and about the consistency of golden syrup, has a peculiar odour and a bitter taste. Should not be stowed with goods liable to damage by contact.

20 cwt. in casks should stow in 50 feet.

CANDLES.—Boxes of Candles, being light and easily worked, should be stowed over heavier goods in a cool part of the vessel. Stevedores' men, if not watched, will sometimes use fragile articles of this nature to block off heavy cases. This would be considered bad stowage, and likely to result in loss to the ship should she encounter heavy weather.

Generally packed in boxes weighing about 56 lbs. each. Price's Patent Candles for exportation run about 28 lbs. each case. The English Admiralty allow about 100 dozen to the ton.

20 cwt. in cases stow in about 56 feet.

CANELLA.—The bark of a tree, used as a tonic, and sometimes as a spice. It yields a volatile oil, which is often mixed with Oil of Cloves. In commerce the bark is also known as White Cinnamon or White Wood Bark. It is exported from the Bahamas and West Indies.

CANELLA ALBA, or Wild Cinnamon, exported in casks and cases, in long pieces, some rolled in quills and others flat; the quilled is thicker than Tree Cinnamon. (*See* **Cinnamon.**)

CANES, Malacca.—In bundles.

Canes from China, packed in bundles of 500 pieces each, measure 7 to 12 feet. Stow as ordinary cargo.

CANNED OR PRESERVED MEATS, JAMS, FRUIT, etc.—Cases of Condensed Milk average 56 to 60 lbs. and measure 1 ft. 2 ins. each.

Cases of Preserved Beef, 32 lbs. measure 7 inches each.
" " " 60 " " 1 ft. 1 in. each.
" " " 97 " " 2 ft. 1 in. each.
" " " 113 " " 2 ft. 4 ins. each.

Box containing 2 doz. Chow Chow, weight 77 lbs., measures 1 ft. 8 in.

Barrels of Cranberries, 130 to 135 lbs. each, measures 6 ft. 6 ins. each.

Boxes of Preserved Indian Corn, 48 lbs., measure 1 ft. 2 ins.

Boxes of Farina, 56 to 64 lbs., measure 1 ft. 5 ins. to 2 ft. 3 ins. each.

Boxes of Flarini Figs, 56 to 63 lbs., measure 2 ft. 3 ins. to 2 ft. 8 ins. each..

Drums of Figs weigh 24 lbs. each.

Boxes of Gelatine, 12 to 16 lbs., measure 1 ft. 1 in. to 2 ft. 2 ins. each.

Barrels of Gelatine measure 7 ft. 5 ins. each.

Cases of Hominy measure 1 ft. 6 ins. each.

Barrels of Hominy weigh 220 lbs. and measure 6 ft. 11 ins. each.

Cases of Honey measure 1 ft. 6 ins. each.

Barrels of Maizena weigh 243 to 262 lbs., and measure 6 ft. 9 ins. to 6 ft. 10 ins.

Barrels of Maltine measure 9 ft. 10 ins. each.

Barrels of Oysters weigh 263 lbs. and measure 6 ft. 6 ins. each.

Boxes of Oysters contain 4 doz. tins, 58 to 60 lbs., and measure 1 ft. 4 ins.

10 Barrels of Oysters equal one ton or 2,240 lbs.

Cases of Preserved Peaches, 49 to 51 lbs., measure 1 ft. 2 ins. to 1 ft. 3 ins.

Cases of Preserved Pears, 68 lbs., measure 1 ft. 6 ins. each.

Cases of Peppermint weigh 79 lbs. and measure 3 ft. 2 ins. each.
Cases of Raisins, ¼ box weighs 7½ lbs. and measures 3 ins.
,, ,, ½ ,, 16¼ ,, ,, 5 ins.
,, ,, 1 ,, 32 to 38 lbs. ,, 8 ins.
Cases of Squash weigh 76 lbs. and measure 1 ft. 8 ins. each.
Half box of Starch weighs 48 to 64 lbs. and measures 1 ft. 2 ins. to 2 ft. 7 ins.
1 Barrel of Starch weighs 230 to 250 lbs. and measures 5 ft. 6 ins.
One case Florida Water measures 2 ft. 10 ins.
One Case Vaseline measures 9 ft. 1 in.
2 doz. Tins Apricots weigh 67 to 70 lbs. and measure 1 ft. 7 ins. each.
2 doz. Tins of Apples weigh 70 to 91 lbs. and measure 1 ft. 8 ins. to 2 ft. 10 ins. each.

CANTHARIDES.—Spanish Fly, or the Blistering Beetle. The powder and tincture, of a highly poisonous nature, have a medicinal value. The strength of this poison may be estimated when it is known that the 100th part of a grain will leave a large blister on the lips of a human being. It has a disagreeable, sickly odour, and whether in casks or cases should not be put among edible goods. Only shipped in small quantities.

CANTON MATTING.—In rolls, 20 cwt. stow in about 160 feet.

CANVAS.—Sails, Awnings, Sail Cloth, etc., should not be stowed where they can become damp or get stained by iron rust, as would result if stowed against stanchions, etc., in the holds. Loose newspapers or pieces of brown packing paper should be spread about when rats are around, otherwise they will destroy the canvas by eating holes in it.

The length of canvas contained in a bolt is from 31 to 43½ yds.
Bolts weigh from 29 to 49 lbs., and measure 24 ins. by 9 ins. by 10 ins.

20 cwt. in bales should stow in 47 feet.

CAOUTCHOUC.—*See* **India-rubber.**

CAPERS.—In kegs, 20 cwt. stow in about 70 feet.

CARTHAMUS SEED (sometimes called *Sursee Seed*).—20 cwt. will stow in about 90 feet.

CARAWAY SEEDS.—In bags 20 cwt. should stow in 60 feet.

CARDAMOMS.—Light, dry seeds, packed in bags, boxes, bundles, or robins—usually in boxes. They have a rather pleasant odour, but should not be stowed near tea, butter, etc.

In cases, 20 cwt. stow in about 94 feet.

CAROBS.—Shipped in casks from Italian ports. 20 cwt. should stow in 31 feet.

CARPETS.—Persian Carpets are generally shipped in rolls. 20 cwt. stow in about 80 feet. Bales in 140 feet.

CARTRIDGES.—*See* **Ammunition.**

CASHEW NUT.—Kidney shaped, the kernel oily, but pleasant and wholesome. It is sometimes mixed with wine, and also with chocolate. A kind of gum exudes from the bark, not unlike gum arabic.

20 cwt. in bags stow in 75 feet.

CASKS, BARRELS, KEGS, and PUNCHEONS, etc.—Owners have often to pay large sums of money for the loss sustained by improper stowage of casks. It is usually allowed to stow 3 heights of pipes, 4 heights of puncheons, 6 heights of hogsheads, 6 heights of tierces of beef or pork, and 8 heights of flour or bread barrels. Authorities differ as to the best means of stowing large quantities. Casks properly stowed either bilge-and-bilge, or bilge-and-cantline, will under ordinary circumstances turn out in good order. The following is the opinion of "Stevens on Stowage." "In stowing let them be carefully bedded and quoined; use the slice in preference to the crowbar; see that the bung holes are all up, the bilge free and the heads clear; the beds should be thick enough to keep the bilge clear when placed near the heads, commonly called the quarters, which is the proper position, being the strongest part of the cask. Let the chines meet, so that the chine of one cask shall not work into the head of the next." Ainsley says: "Place them exactly fore-and-aft, bung up and bilge free, well quoined with three inches of soft wood beds, and not trust to hanging beds. All liquids should be bilge-and-cantline for two reasons. 1st.—When stowed in this way they are much safer; in fact, they almost stow themselves. 2nd.—Because you only require the size of the head of the cask to stow each tier, thus economising space. Plenty of quoins should be used in stowing casks. The bilges should be free, not only from underneath, but from the cask also on either side; they must be stowed close until the longer is completed, and then wedged off by driving quoins in each upper quarter. If the casks are not exactly in a fore-and-aft line the chines will crack, and get broken in breaking them out of their places. The space between casks should be filled up just high enough for the beds to rest upon, that the strain from the upper heights may not fall entirely on the lower casks." This is good advice, especially if little time is allowed for stowing

cargo of this sort. Casks roughly stowed bilge-and-cantline will take less harm on a voyage than casks stowed roughly bilge-and-bilge. (*See* **Petroleum.**)

Avoid stowing casks of oil or grease over casks of beer or wine. In stowing a large quantity of casks in any hold begin amidships, and stow the first longer fore-and-aft; then stow each tier out towards the wings, being careful to see the wing casks well blocked off, as they have to stand against the weight of the rest when the ship is working at sea. Avoid lifting full casks with case-hooks. Casks containing liquids should never be stowed over casks containing dry articles. Care should be taken when receiving empty casks for stowage below that they are kept bung up, so as not to damage other goods in the same hatch. This has occurred, especially on coasting vessels carrying empty oil casks.

Empty palm oil casks weigh about 270 lbs. each. 20 cwt. stow in 400 feet.

1 tun	452 gallons
1 pipe	126 ,,
1 puncheon	84 ,,
1 hogshead	63 ,,

DIMENSIONS AND GALLON CAPACITY OF CASKS.

	Length. ft.	in.		Breadth. ft.	in.		Contents in gallons.
Port, pipe	4	10	...	2	10	...	113 to 116.
Do., hogshead	3	1	...	2	6	...	56 — 58.
Sherry, butt	4	2	...	2	11	...	108 — 112.
Sherry, hogshead	3	2	...	2	4	...	54 — 56.
Marsala, pipe	5	5	...	2	8	...	90 — 96.
Do., hogshead	3	5	...	2	1	...	45 — 48.
Brandy, pipe	4	4	...	2	10	...	114 — 118.
Do., hogshead	3	4	...	2	4	...	57 — 59.
Rum, puncheon	3	6	...	3	0	...	90 — 96.

CASSIA AND BUDS.—Over one hundred species of this plant (*Lignea Fistula*) are known to exist. The bark and roots of several species are used medicinally. Others are used as substitutes for Coffee, and for tanning purposes. Cassia bark or China Cinnamon is often used as a substitute for the true cinnamon. Cassia buds are like cloves and are used in confectionery.

Stow in a dry part and away from any articles liable to damage.

Cassia Buds from China packed in cases measuring 4 to 6 feet weigh 1 picul nett. Value $27 to $38 per picul.

Cassia Lignea, shipped in China ports, is packed in cases measuring 5 ft. 9 ins. to 6 feet and weigh 60 catties nett; 4 ft. 6 ins. to 4 ft. 9 ins., weight 50 catties nett. Frail cases. Value $15 to $24 per picul.

Broken Cassia, in bales or bundles, average 3 feet measurement, 100 catties weight. Value $4 to $8 per picul.

20 cwt. of Cassia in cases should stow in 184 feet.

Cassia Buds in cases, 20 cwt. stow in 130 feet.

20 cwt. of Cassia in bundles stow in 130 feet.

Cassia is never put into a tea cargo for England; for America cassia in mats is shipped without prejudice to the cargo; the mats, which contain 1 lb. and 2 lbs. each, are stowed under the beams, etc., and where nothing else will go.

CASTOR OIL.—*See* **Oil.**

CASTOR SEED.—20 cwt. in bags stow in about 70 feet.

CATTLE.—Large numbers of cattle are carried by steamers from America to the U.K. and Continent.

The stalls are fitted by experienced carpenters and are strongly put up, the thwartship beams being 4 inches by 4 inches thick; they are carried across from side to side. A few planks are nailed between every four animals. They are placed facing amidships, to enable the attendants to feed and water them. Where cattle are carried between foreign ports, or between the U.K. and Continent, it is advisable for the master and officers to obtain all information necessary to prevent trouble with the authorities. Every nation has some particular law or act regarding the shipping and carrying of animals, and to enable those on board to observe and carry out such, full information should be sought and obtained.

The Government of the United States having framed their Cattle and Grain laws as much as possible in conformity with those of Great Britain, there is no difficulty in understanding and carrying them out. The U.S. Department of Agriculture, and the Government of Canada, have issued Orders with Regulations for the Transport of Animals to Foreign Countries, which are given in the following pages.

Use every precaution against fire. Allow no smoking about the decks or below during the voyage.

Each animal has 6 gallons of fresh water per 24 hours, and 14 lbs. of hay.

THE OCEAN CATTLE TRADE.

In the report of the Departmental Committee of the Board of Trade and Agriculture, to inquire into the Transatlantic Cattle Trade, a great many witnesses were examined, and recommendations were eventually made by the Committee for the proper carrying on of the Cattle trade to the United Kingdom.

The Board of Agriculture and Fisheries was accordingly authorised and exercises powers under the "Diseases of Animals Acts, 1894 to 1909."

ORDER OF THE BOARD OF AGRICULTURE AND FISHERIES.

(DATED 22ND APRIL, 1910.)

FOREIGN ANIMALS ORDER OF 1910.

With Amendments to 1913.

Interpretation.

1.—In this Order, unless the context otherwise requires:—

"The Board" means the Board of Agriculture and Fisheries:

"The Act of 1894" means the Diseases of Animals Act, 1894:

"Cattle" means bulls, cows, oxen, heifers, and calves:

"Animals" means cattle, sheep, and goats, and all other ruminating animals, and swine:

"Carcase" means the carcase of an animal, and includes part of a carcase, and the meat, bones, hide, skin, hoofs, horns, offal, or other part of an animal, separately or otherwise, or any portion thereof:

"Scheduled country" means a country or part of a country included in the First Schedule to this Order:

"Foreign" applied to animals and things, means brought to the United Kingdom from any country out of the United Kingdom, and "foreign country" includes any such country:

"Foreign Animals Wharf" means a part of a port defined by Special Order of the Board for the landing of foreign animals subject to slaughter at the port of landing:

"Person" includes a body corporate:

"Port" includes place:

"Superintendent of a Foreign Animals Wharf" includes a foreman or wharfinger or other person in charge of a Foreign Animals Wharf:

"Market authority" means the person in occupation of a Foreign Animals Wharf, whether as owner, lessee, or otherwise:

"Reception-lair" means a lair adjacent or near to the place of landing which is set apart for the reception of any animals immediately after landing for the purpose of their examination:

"Lairage-men" means men specially appointed by the market authority for the purpose of landing animals at a Foreign Animals Wharf and feeding and watering and tending them in a reception-lair:

"Disease" means cattle-plague (that is to say, rinderpest, or the disease commonly called cattle-plague), contagious pleuro-pneumonia of cattle, foot-and-mouth disease, sheep-pox, sheep-scab, or swine-fever:

"Fodder" means hay or other substance commonly used for food of animals:

"Litter" means straw or other substance commonly used for bedding or otherwise for or about animals:

"Master" includes a person having the charge or command of a vessel:

Other terms have the same meaning as in the Act of 1894.

CHAPTER I.—ANIMALS NOT INTENDED TO BE LANDED AT A FOREIGN ANIMALS WHARF.

Prohibition of bringing Cattle, Sheep, Goats, or Swine from Scheduled Country into a Port in Great Britain.

2.—It shall not be lawful, except under the authority of a licence granted by the Board and subject to any conditions thereby imposed, to bring into a port in Great Britain any cattle, sheep, goats, or swine brought from a port in a scheduled country, but this Article shall not apply to any vessel not bound to a port in Great Britain which comes into a port under stress of weather or for repairs or for any purpose other than the delivery or shipment of cargo.

Conditions applicable to Vessels while in port.

3.—In the case of any cattle, sheep, goats, or swine brought into a port in Great Britain from a port in a scheduled country, the following conditions shall apply while the vessel is in the port, namely:—

(i) The animals shall not, except under the authority of a licence granted by the Board and subject to any conditions thereby imposed, be removed from the vessel in which they are brought to Great Britain, and then only in accordance with the provisions of the Diseases of Animals Acts, 1894 to 1909, and this Order.

(ii) Except where the licence otherwise provides, the animals shall not be removed from the vessel until they have been examined by a Veterinary Surgeon on behalf of the Board, and any Inspector of the Board or Veterinary Surgeon employed for that purpose by the Board shall be permitted to examine the animals at such time or times as he may require.

(iii) No person, except Inspectors of the Board, Officers of Customs and Excise, and persons while actually engaged in tending the animals or cleansing or disinfecting the pens, shall enter a pen in which the animals are, or have recently been kept, until the pen has been cleansed and disinfected.

(iv) Every person upon leaving a pen in which the animals are or have recently been kept shall thoroughly wash his hands with soap and water and disinfect his boots with a five per cent. solution of carbolic acid, and every such person landing from the vessel in Great Britain shall take such other steps as may be necessary to disinfect his clothes.

(v) The vessel shall, from time to time as and when required by notice signed by an Inspector of the Board, be cleansed and disinfected as follows:—

(*a*) All parts of the vessel with which the animals or their dung have come in contact shall be scraped and swept and then thoroughly washed or scrubbed or scoured with water, and subsequently disinfected in the manner prescribed by this Order.

(*b*) All fittings, pens, hurdles, or utensils used for or about the animals shall be scraped and then cleansed and disinfected in the same manner.

(*c*) While any part of the vessel is being cleansed or disinfected all animals shall be temporarily removed therefrom.

(vi) While the vessel remains in any port in Great Britain, all dung of the animals, and all litter, scrapings, and sweepings removed from the pens, shall at intervals not exceeding twenty-four hours be thoroughly mixed with quicklime and thereafter without delay either be destroyed by fire on board the vessel or be disposed of as an Inspector of the Board may direct.

Prohibition of landing of Animals from certain Foreign Countries.

4.—(1.) It shall not be lawful to land in Great Britain any animals brought from a port in a scheduled country.

(2.) It shall not be lawful to land in Great Britain any animal exported from the Cape Verde Islands, Madeira, the Azores or the Canary Islands.

Prohibition of Landing of Swine from the United States of America.

5.—It shall not be lawful to land in Great Britain any swine brought from a port in the United States of America.

Prohibition of Landing of Carcases, etc.

6.—(1.) It shall not be lawful to land in Great Britain—

(*a*) a carcase of an animal which has died or been slaughtered on board a vessel while in a port in a scheduled country or during the passage from any such port to Great Britain or thereafter while in any port in Great Britain ; or

(*b*) the dung of any such animal : or

(*c*) any partly consumed or broken fodder that has been supplied to any such animal ; or

(*d*) any litter that has been used for or about any such animal ; or

(*e*) any fittings, pens, hurdles, or utensils used for or about any such animal unless they have been scraped and then thoroughly washed or scrubbed or scoured with water, and subsequently disinfected in the manner prescribed by this Order, and unless the permission of an Inspector of the Board for the landing thereof has been obtained.

(2.) The Principal Officer of Customs and Excise may seize and detain any carcase, dung, fodder, litter, fittings, pens, hurdles, or utensils landed in contravention of this Article, and he shall forthwith report the facts to the Commissioners of Customs and Excise, who may give such directions as they think fit for the destruction or disposal thereof.

CHAPTER 2.—TRANSHIPMENT.

Transhipment.

7.—(1.) Foreign animals shall not be transhipped in a port in Great Britain otherwise than in accordance with this Article or under the authority of a licence granted by the Board and subject to any conditions thereby imposed.

(2.) Transhipment, otherwise than under the authority of a licence granted by the Board, shall not take place in any dock except with the special permission of the Principal Officer of Customs and Excise or of some person authorised to act on his behalf, and such special permission shall be given only when on account of the state of the tide or for some other special circumstance transhipment otherwise than in a dock is impracticable or inexpedient. Where such special permission has not been obtained the master of the vessel in which the animals are imported shall give all facilities for the transhipment of the animals before the vessel enters any dock in Great Britain.

(3.) Animals intended to be landed at a Foreign Animals Wharf may be transhipped from the vessel in which they are imported to a landing-vessel provided by the port authority or market authority, if the use of the vessel for such purpose has previously been sanctioned by the Commissioners of Customs and Excise, either generally or in the particular instance.

(4.) The animals shall be transhipped in the presence and under the supervision and control of an Officer of Customs and Excise, and an Officer of Customs and Excise shall remain in charge of the animals on board the landing-vessel until its arrival at the Foreign Animals Wharf.

(5.) The landing-vessel shall proceed direct to the Foreign Animals Wharf, and the animals shall be landed there in the presence and under the supervision and control of an Officer of Customs and Excise.

(6.) The landing-vessel shall not be used for any other purpose during the time of its being so appropriated.

(7.) All parts of the landing-vessel with which the animals or their dung have come in contact shall immediately after each occasion of use, and before being again used, be scraped and swept, and then thoroughly washed or scrubbed

or scoured with water, and subsequently disinfected in the manner prescribed by this Order.

(8.) The scrapings and sweepings of the landing-vessel shall not be landed unless and until they have been well mixed with quicklime.

(9.) Animals transhipped under this Article shall continue to be deemed foreign animals.

CHAPTER 3.—ANIMALS INTENDED TO BE LANDED AT A FOREIGN ANIMALS WHARF.

Landing of Foreign Animals not brought from a Scheduled Country and destined for a Foreign Animals Wharf in Great Britain.

8.—(1.) The landing of foreign animals, the landing of which in Great Britain is not prohibited by this Order, is hereby made subject to the following conditions :

First. That the vessel in which they are imported has not, within twenty-eight days before taking them on board, had on board an animal exported or carried coastwise from a port in a scheduled country.

Second. That the vessel has not within twenty-one days before taking on board the animals imported, or at any time since taking them on board, entered or been in a port in a scheduled country.

Third. That the animals imported have not, while on board the vessel, been in contact with an animal exported or carried coastwise from a port in a scheduled country.

(2.) Animals shall not be landed unless and until the master of the vessel in which they are imported has on the occasion of such importation delivered to the Commissioners of Customs and Excise or their proper officer a declaration made and signed that all the animals then imported therein are properly imported according to the provisions of this Article.

Charge of Animals on Landing at a Foreign Animals Wharf.

9.—(1.) Animals landed at a Foreign Animals Wharf shall, when landed, be placed under the charge of an Inspector of the Board ; and, until his arrival, they shall remain under the charge of the Commissioners of Customs and Excise.

(2.) It shall not be lawful for any person to move any animals so long as they remain under the charge of the Commissioners of Customs and Excise or of an Inspector of the Board except with the permission of the Commissioners or of the Inspector, as the case may be.

Disposal of Animals on Landing.

10.—Animals when landed at a Foreign Animals Wharf shall be driven by lairage-men to the nearest available reception-lair or lairs within the limits of the Wharf, there to await the examination of an Inspector of the Board, and, until so examined, shall not be allowed to come in contact with any animals other than those forming part of the same cargo.

Examination of Animals.

11.—(1.) The animals shall be examined in a reception-lair by an Inspector of the Board during daylight.

(2.) If on such examination all the animals are found to be free from disease, the Inspector of the Board may permit the animals to be retained in such lair, which shall thereupon cease to be a reception-lair, or he may permit them to be moved out of such lair and into such other parts of the Foreign Animals Wharf as the market authority or its officers or the Inspector of the Board shall direct or permit.

(3.) In the case of a cargo of animals landed or intended to be landed at different times or different ports in Great Britain, an Inspector of the Board may cause the animals in a reception-lair to be there detained until he has examined, or become acquainted with the result of the examination of, the rest of the cargo.

Time for Slaughter.

12.—(1.) The owner of an animal landed at a Foreign Animals Wharf shall cause the same to be slaughtered within ten days after the landing thereof, exclusive of the day of landing, in accordance with the provisions of this Article.

(2.) The slaughter of the animals may be commenced at any time after the landing thereof with the permission of an Inspector of the Board.

(3.) The slaughter of the animals shall be commenced at such time after the landing thereof as an Inspector of the Board in any case may direct, and when commenced shall be completed as soon as practicable.

(4.) Where an Inspector of the Board for any reason considers that an animal should be forthwith slaughtered and shall so direct, the animal shall be slaughtered accordingly.

Restrictions on Access to Foreign Animals Wharf.

13.—(1.) No person, except officers of Customs and Excise, lairage-men, the Superintendent of the Foreign Animals Wharf, Inspectors of the Board, and such other persons as may be specially authorised in writing by an Inspector of the Board, shall during the time of the landing of the animals enter upon the landing-stage, pier, quay, or other part of the Foreign Animals Wharf at which the animals are landed, and no person except as aforesaid shall at any time enter upon any part of the Wharf which is being used as a reception-lair.

(2.) No person shall during the landing of the animals enter upon the part of the Wharf at which the animals are landed or at any time enter a reception-lair unless he is wearing suitable overall coat and leggings, and every person who enters such part of a Wharf or reception-lair shall forthwith after leaving the same remove his overall clothes, and thoroughly wash his hands with soap and water and disinfect his boots.

(3.) Overall clothes shall not be removed from a Foreign Animals Wharf unless and until they have been thoroughly disinfected.

(4.) Any person desiring to enter a Foreign Animals Wharf may be required by any officer authorised in writing in that behalf by the market authority to state the nature of the business necessitating such entry, and if he declines to make such statement, or if the officer requiring such statement is not satisfied as to the correctness of the same, or that the business necessitates his entry, the officer so authorised may prohibit his entry into the Wharf.

(5.) The market authority shall give notice of the provisions of this Article by placards, which shall be kept affixed at or near the entrance of any landing-stage, pier, quay, reception-lair, or other part of the Wharf to which access is for the time being restricted by this Article.

Power to exclude Persons.

14.—(1.) An Inspector of the Board, or the Superintendent of a Foreign Animals Wharf, is hereby empowered to affix at or near the entrance thereof or of any building therein, a notice forbidding persons to enter therein without the permission mentioned in the notice; and thereupon any person who enters or goes into, on, or over such premises without that permission shall be deemed guilty of an offence against the Act of 1894.

(2.) An Inspector of the Board, or the Superintendent of a Foreign Animals Wharf, is hereby empowered to direct any person to quit such Wharf, or any particular building, lair, landing-stage, pier, quay, or other portion thereof; and thereupon any person who fails to quit such premises on direction as aforesaid shall be deemed guilty of an offence against the Act of 1894.

Provision of Overall Clothes.

15.—The market authority shall at all times provide to the satisfaction of the Board suitable overall coats and leggings for the use of lairage-men and other persons entering the Wharf.

Disinfection of Persons and Clothes.

16.—An Inspector of the Board, or the Superintendent of a Foreign Animals Wharf, may affix at or near the entrance of the Wharf or any building therein a notice to the effect that persons before entering such Wharf or building, or before leaving such Wharf or building as may be stated in the notice, will be required to disinfect themselves and their clothes in the manner specified in such notice, and thereupon every person shall disinfect himself and his clothes accordingly.

Regulations in case of Detection of Disease in Foreign Animals Wharf.

17.—If it appears to an Inspector of the Board that disease exists or has lately existed in a reception-lair, or in any particular building, slaughter-house, or other part of a Foreign Animals Wharf, all the animals that are then within such reception-lair, building, slaughter-house, or other part of a Wharf shall be there detained by the Inspector of the Board or shall be moved to such other part of the Wharf as he shall direct or permit, and the same shall be dealt with in accordance with instructions given by the Inspector of the Board.

Food and Water.

18.—(1.) Animals landed at a Foreign Animals Wharf shall, until they are taken charge of by the owners or consignees, be supplied by the market authority or the person in charge of the animals with a proper and sufficient supply of food and water, and the expenses incurred by them in respect thereof shall be recoverable by such authority or person from the owners or consignees in any court of competent jurisdiction.

(2.) The animals shall, after they have been taken charge of by the owners or consignees, be supplied by the owners or consignees with a proper and sufficient supply of food and water.

(3.) The food supplied to sucking calves in accordance with this Article shall be gruel or milk or other proper food.

(4.) If an animal remains without a proper and sufficient supply of food or water in contravention of this Article, the market authority, and the owner and the consignee and the person in charge of the animal, shall, each according to and in respect of his own acts and defaults, be deemed guilty of an offence against the Act of 1894; and it shall lie on the person liable to supply food and water to the animal when charged to prove the proper and sufficient supply of food or water or both and the time when the same was so supplied.

Movement of Carcases, Manure, etc.

19.—(1.) No carcase, offal, fodder, litter, dung, or manure shall be removed from a Foreign Animals Wharf, except with the permission of an Inspector of the Board.

(2.) All dung and manure shall, before being so removed, be disinfected to the satisfaction of an Inspector of the Board.

(3.) If an Inspector of the Board is of opinion that any such carcase or thing as aforesaid may introduce disease, the same shall be destroyed or otherwise dealt with in accordance with instructions given by the Inspector.

Removal of Fittings, etc., from Foreign Animals Wharf.

20.—(1.) Fittings, pens, hurdles, or utensils that have been used for or about animals and have been landed from a vessel at a Foreign Animals Wharf shall not be removed from such Wharf unless they have been scraped and subsequently disinfected in the manner prescribed by this Order, and unless the permission of an Inspector of the Board for the removal thereof has been obtained.

(2.) If an Inspector of the Board is of opinion that any such thing as afore-

said may introduce disease, the same shall be destroyed or otherwise dealt with in accordance with instructions given by the Inspector.

Disinfection of Foreign Animals Wharf.

21.—An Inspector of the Board may give notice in writing to the market authority or Superintendent of a Foreign Animals Wharf requiring the cleansing and disinfection of any portion of the Wharf by such market authority, and when such notice shall have been given, that portion of the Wharf shall not be used for animals unless and until it has been cleansed and disinfected to the satisfaction of an Inspector of the Board.

Restriction on Use of Foreign Animals Wharf.

22.—(1.) No animals other than foreign animals shall at any time be landed at or moved into or kept in a Foreign Animals Wharf.

(2.) Any animal being in a Foreign Animals Wharf shall, without prejudice to the recovery of any penalty for the infringement of this Article, be deemed to be a foreign animal, and the provisions of this Order shall apply to such animal accordingly.

(3.) A Foreign Animals Wharf shall not be used for any purpose other than the purposes authorised by the Diseases of Animals Acts, 1894 to 1909, or any Order of the Board under the said Acts in relation thereto.

CHAPTER 4.—LANDING, DISINFECTION, AND DISPOSAL OF DUNG, FODDER, LITTER, FITTINGS, AND OTHER THINGS.

Landing subject to Customs Regulations.

23.—All dung of animals carried from a foreign country, and all fodder, litter, fittings, pens, hurdles, or utensils used for or about such animals, and all other dung, fodder, or litter brought in the same vessel with such animals, shall, if landed, be landed in such manner, at such times, at such places, and subject to such supervision and control, as the Commissioners of Customs and Excise direct.

Regulations as to Landing and Disinfection of Dung, Fodder, etc.

24.—(1.) Dung of animals carried from a foreign country, and partly consumed or broken fodder that has been supplied to such animals, and litter that has been used for or about such animals, shall not be landed at any place without the previous consent in writing of the Local Authority of the District in which the place is situate.

(2.) All other fodder and litter brought in the same vessel with animals carried from a foreign country may be landed without the previous consent of the Local Authority, but shall, when landed, remain under the charge of an Officer of Customs and Excise, and such fodder and litter shall not be removed from the place of landing except with the permission in writing of an Officer of Customs and Excise.

(3.) Fittings, pens, hurdles, or utensils used for or about animals carried from a foreign country shall not be landed at any place without the previous consent in writing of the Local Authority of the District in which the place is situate unless they have been scraped and then thoroughly washed or scrubbed, or scoured with water, and subsequently disinfected in the manner prescribed by this Order. If landed with such consent without having been so previously cleansed and disinfected they shall be forthwith cleansed and disinfected in the manner aforesaid by and at the expense of the owner, and shall not be removed or permitted to come in contact with animals until so cleansed and disinfected.

(4.) All dung of animals carried from a foreign country, and all partly consumed or broken fodder that has been supplied to such animals, and all litter

that has been used for or about such animals, shall, when landed, be forthwith well mixed with quicklime and be effectually removed from contact with animals.

(5.) Nothing in this Article shall apply to any such dung, fodder, litter, fittings, pens, hurdles, or utensils landed at a Foreign Animals Wharf.

CHAPTER 5.—DISINFECTION OF VESSELS, MOVABLE GANGWAYS, AND OTHER APPARATUS.

Disinfection of Vessels.

25.—(1.) In the case of a vessel from which animals carried from a foreign country have been landed in Great Britain, each compartment of the vessel shall, after the landing of the animals therefrom, and before any animal or cargo is placed in that compartment, be cleansed and disinfected as follows:

(i.) All parts of the compartment with which the animals or their dung have come in contact shall be scraped and swept, and then thoroughly washed or scrubbed or scoured with water, and subsequently disinfected in the manner prescribed by this Order;

(ii.) All fittings, pens, hurdles, or utensils used for or about the animals shall, if not removed from the vessel, be scraped, and then cleansed and disinfected in the same manner.

(2.) Each part of the vessel with which the animals or their dung have come in contact, and all fittings, pens, hurdles, and utensils, used for or about animals, shall be cleansed and disinfected in accordance with the provisions of this Article before any other animal or any cargo is allowed to come in contact therewith.

(3.) The scrapings and sweepings of the vessel shall not be landed unless they have been well mixed with quicklime, and when landed they shall be effectually removed from contact with animals.

Disinfection of Movable Gangways and other Apparatus.

26.—(1.) A movable gangway, passage-way, cage, or other apparatus, used or intended for the loading or unloading on or from a vessel of animals carried from a foreign country, or otherwise used in connection with the transit of such animals, shall, so soon as practicable after being so used, be scraped and swept, and then thoroughly washed or scrubbed or scoured with water and subsequently disinfected in the manner prescribed by this Article.

(2.) The scrapings and sweepings, and all dung, litter, and other matter so removed shall forthwith be well mixed with quicklime and be effectually removed from contact with animals.

Disinfection of Vessels arriving in Great Britain after Discharge of Animals.

27.—In the case of a vessel from which animals carried from a foreign country have been landed elsewhere than in Great Britain, this Chapter shall apply when the vessel arrives in a port in Great Britain, if and so far as its requirements have not already been complied with.

CHAPTER 6.—PROTECTION OF ANIMALS.

Protection of Animals.

28.—This Chapter shall apply in the case of every vessel in or on which foreign animals intended to be landed at a Foreign Animals Wharf are carried to a port in Great Britain.

Parts of Vessel to be used.

(i.) Animals shall not be carried on more than three decks unless a licence from the Board has been previously obtained exempting the vessel from this requirement.

(ii.) Animals shall not be carried on any hatch above a compartment where other animals are carried, or on any hatch the coamings of which exceed eighteen inches in height.

(iii.) Animals shall not be carried in any part of the vessel where, in ordinary course of navigation, they would interfere with the proper management or ventilation of the vessel, or with the efficient working of the boats.

Pens and Fittings of Vessels.

(iv.) All animals shall be carried in pens.

(v.) No pen shall exceed eleven feet in length and nine feet in breadth, and each pen shall be constructed in such a manner, and with materials of such character and strength as to be able to withstand the action of the weather, and to resist the weight of the animals thrown against it.

(vi.) Ship's fittings likely to cause injury or unnecessary suffering to animals shall be properly and securely fenced off.

(vii.) The floor of each pen shall, in order to prevent slipping, be fitted with suitable battens or other proper footholds which shall be securely fastened to the deck by angle iron plates or otherwise, and shall be strewn with a proper quantity of sand or other suitable substance.

(viii.) Animals while on board a vessel shall be protected against injury or unnecessary suffering from undue exposure to the weather.

Space for Animals.

(ix.) Sufficient space shall be allotted in every pen to enable the animals therein properly to feed and rest during the voyage.

Overcrowding.

(x.) The vessel shall not be overcrowded in any part or pen so as to cause injury or unnecessary suffering to the animals therein.

Passage-Ways.

(xi.) Between every two rows of animals, and in front of every single row of animals, there shall be a passage-way of a minimum width of one foot and six inches, which passage-way shall be kept free of obstruction.

Ventilation.

(xii.) All parts of the vessel on which animals are carried shall be sufficiently and suitably ventilated. All such parts if below deck shall, in addition to any ventilation obtained by means of the hatchways, be provided with sufficient and suitable ventilators for the removal of foul air and for the admission of a proper supply of fresh air to all the animals carried.

Light.

(xiii.) Arrangements shall be made for the provision at all times of adequate light for the proper tending of the animals.

Food and Water.

(xiv.) When animals are carried on a vessel for a voyage which on an average takes more than eighteen hours, they shall be provided while on board with a sufficient amount of food and water, and proper accommodation shall be provided on board for the stowage of food so that the same shall not be unduly exposed to the weather.

Securing of Cattle.

(xv.) All cattle, whether polled or not, while being carried on a vessel shall be securely tied by the head or neck in such a manner as not to cause unnecessary suffering and so as to stand athwartships.

Approaches, Gangways, and other Apparatus.

(xvi.) Approaches, gangways, passage-ways, cages, and other apparatus used for the landing of animals from a vessel shall be so constructed that injury or unnecessary suffering shall not be caused to the animals.

Attendance.

(xvii.) The vessel shall, in addition to the ordinary crew, carry a sufficient number of qualified attendants to tend the animals properly; and every consignment of cattle shall be in charge of a responsible foreman, who shall have under him competent assistants numbering with himself one for every twenty-five head of cattle; and proper and suitable accommodation for all these persons shall be provided.

Injured Animals.

(xviii.) If any animal on board a vessel has a limb broken or is otherwise seriously injured, the master of the vessel shall forthwith cause that animal to be slaughtered unless he is satisfied that it can be kept alive and led away without cruelty.

CHAPTER 7.—SPECIAL PROVISIONS IN EVENT OF A COUNTRY OR PART OF A COUNTRY BEING DECLARED BY SUBSEQUENT ORDER TO BE A SCHEDULED COUNTRY FOR PURPOSES OF THIS ORDER.

Landing at Foreign Animals Whar .

29.—In the event of a country or part of a country being declared by subsequent Order of the Board to be a scheduled country for the purposes of this Order, animals carried in a vessel leaving the scheduled country before the commencement of such subsequent Order may, notwithstanding the provision of Article 4 of this Order, be landed at a Foreign Animals Wharf in Great Britain in accordance with the provisions of this Chapter, but not otherwise.

Special Provision as to Animals destined for Manchester Foreign Animals Wharf.

30.—The animals if intended to be landed at the Manchester Foreign Animals Wharf shall not be carried through the East Ham lock until they have been examined by an Inspector of the Board, and unless and until the Inspector certifies that his examination and information do not show that there is, or during the voyage has been, an animal on board affected with foot-and-mouth disease.

Inspection by Inspector of the Board.

31.—An Inspector of the Board shall be permitted to examine the animals on board the vessel in which they are brought to Great Britain at such time or times as he may require, and the animals shall not be landed or transhipped until they have been so examined.

Duty of Master of Vessel to report Foot-and-Mouth Disease.

32.—If any animal taken on board any vessel for conveyance to Great Britain has during the voyage been affected with foot-and-mouth disease, the master of the vessel shall as soon as possible report the fact to the Inspector of the Board who examines the animals.

Disinfection of Persons and Clothes.

33.—Unless and until an Inspector of the Board certifies that his examination and information do not show that there is, or during the voyage has been,

an animal on board affected with foot-and-mouth disease, every person before landing in Great Britain from the vessel shall, unless he lands at a Foreign Animals Wharf, effectually wash and disinfect himself, and change or effectually disinfect his clothes, so as to prevent the introduction or spread of foot-and-mouth disease by him or his clothes.

Landing or Transhipment subject to Permission of Inspector.

34.—The animals shall not be landed or transhipped except with the permission of an Inspector of the Board, which permission will only be given when the Inspector is satisfied that sufficient lairage and other accommodation is available for the landing and slaughter of the animals in accordance with the provisions of this Order.

Transhipment.

35.—The animals, if so required by an Inspector of the Board, shall be transhipped into vessels approved for such purpose by an Inspector of the Board. Any vessel so used shall be cleansed and disinfected by the owner thereof in such manner as shall be required by an Inspector of the Board.

Landing, etc., at Specified Part of Wharf only.

36.—The animals shall be landed only at such part of the Foreign Animals Wharf as an Inspector of the Board may direct, and when landed shall be driven by lairage-men specially appointed for the purpose to such lairs within the limits of the Wharf as may be specially approved for that purpose by an Inspector of the Board.

Slaughter of Animals.

37.—After such examination as may be required by an Inspector of the Board, the animals shall either be slaughtered immediately in the lairs in which they then are, or they may, with the permission of an Inspector of the Board, be moved forthwith to a slaughter-house in the Wharf specially approved for that purpose by an Inspector of the Board and there immediately slaughtered.

Special Disinfection of Vessel in event of Foot-and-Mouth Disease.

38.—If an Inspector of the Board certifies that there is, or during the voyage has been, an animal on board the vessel affected with foot-and-mouth disease, then after all animals shall have been landed the vessel shall, if instructions to such effect be given by an Inspector of the Board, proceed to sea for a preliminary cleansing and disinfection of the parts of the vessel used for animals, subject to such supervision as the Board may require, and in accordance with any instructions given by an Inspector of the Board.

Disposal of Fittings.

39.—Any fittings used in connection with the animals shall, if so required by an Inspector of the Board, be landed and burnt at such time and place and in such manner as an Inspector of the Board may direct.

Disposal of Dung, Fodder, etc.

40.—The dung of the animals brought in the vessel, and any fodder or litter brought in the vessel, and the fittings, pens, hurdles or utensils used for or about the animals, shall not be landed in Great Britain, except at a Foreign Animals Wharf, unless the Board for some exceptional cause by licence otherwise permit. For the landing thereof at a Foreign Animals Wharf the previous consent of the Superintendent of the Wharf shall be obtained.

CHAPTER 8.—MISCELLANEOUS.

Prescribed Manner of Disinfection.

41.—The prescribed manner of disinfection to be adopted under this Order shall be as follows :—

(i) The place or thing, or the part thereof required to be disinfected, shall be thoroughly washed with—
  (*a*) a one per cent. (minimum) solution of chloride of lime containing not less than thirty per cent. of available chlorine ; or
  (*b*) a five per cent. (minimum) solution of carbolic acid (containing not less than ninety-five per cent. of actual carbolic acid), followed by a thorough sprinkling with limewash ; or
  (*c*) a disinfectant equal in disinfective efficiency to the above-mentioned solution of carbolic acid, followed by a thorough sprinkling with limewash.
(ii) The application of limewash shall not be compulsory as regards such parts of a vessel as are used for passengers or the crew.

Animals dying on Voyage.

42.—(1.) If on a vessel arriving at a port in Great Britain from a foreign country an animal taken on board for the purpose of importation has died or been slaughtered during the voyage, the master of the vessel shall, immediately on arrival at the place of discharge, report the fact to the proper Officer of Customs and Excise at the port.
(2.) The carcase shall not be landed or discharged from the vessel without the permission in writing of the Officer.

General Power of Detention.

43.—If it appears to the Principal Officer of Customs and Excise with respect to any foreign animal, or with respect to any foreign carcase, fodder, litter, dung, or other thing, that disease may be thereby introduced, he may seize and detain the same ; and he shall forthwith report the facts to the Commissioners of Customs and Excise, who may give such directions as they think fit, either for the slaughter or destruction or the further detention thereof or for the delivery thereof to the owner on such conditions, if any (including payment by the owner of expenses incurred by them in respect of detention thereof), as they think fit.

Duties of Local Authority and Police.

44.—The Local Authority and their officers and all constables and police officers shall assist the Inspectors of the Board to carry into effect and enforce this Order, and shall do or cause to be done all things necessary for the effectual execution of the same.

Exemption of Certain Animals.

45.—(1.) This Order shall not, except where otherwise expressly stated, apply in relation to animals brought from the Channel Islands or the Isle of Man.
(2.) Chapters 1 and 3 of this Order shall not apply to an animal the landing of which at a Foreign Animals Quarantine Station has been approved by the Board under the Foreign Animals (Quarantine) Order of 1896.

Offences.

46.—(1.) If any animal, carcase, dung, fodder, litter, fittings, pens, hurdles, utensils, or other thing shall be brought into a port or transhipped or landed or moved in contravention of this Order or of the conditions of a licence granted under this Order, the owner thereof, and the owner and the lessee and the occupier of the place of landing or other place where or from which such animal, carcase, or other thing is landed or moved, and the person causing, directing, or permitting the bringing into port or transhipment or landing or movement, the owner and the charterer and the master of the vessel in which the same is brought or from which the same is transhipped or landed, shall, each according to and in respect of his own acts and defaults, be deemed guilty of an offence against the Act of 1894.

(2.) If any person whose entry into a Foreign Animals Wharf or any part of a Wharf is prohibited enters or attempts to enter into such Wharf or part of a Wharf he shall be deemed guilty of an offence against the Act of 1894.

(3.) If anything is done or omitted to be done as regards cleansing or disinfection in contravention of this Order, the owner and the charterer and the master of the vessel in or in respect of which, and the owner of the gangway or passage-way, cage, or other apparatus in respect of which, and the market authority of the Foreign Animals Wharf in which, and the owner and the lessee and the occupier of any other place or thing in respect of which, as the case may be, the same is done or omitted to be done, shall, each according to and in respect of his own acts and defaults, be deemed guilty of an offence against the Act of 1894.

(4.) If any person fails to carry out or observe any direction as regards cleansing or disinfection, which he is by this Order required to carry out or observe, he shall be deemed guilty of an offence against the Act of 1894.

(5.) If any animal is not slaughtered in accordance with the provisions of this Order, the person failing to cause such slaughter shall be deemed guilty of an offence against the Act of 1894.

(6.) If anything is done or omitted to be done with respect to any vessel or any animals thereon in contravention of this Order, the owner and the charterer and the master of the vessel in which the same is done or omitted to be done, shall, each according to and in respect of his own acts and defaults, be deemed guilty of an offence against the Act of 1894.

FIRST SCHEDULE.

Prohibited Countries and Parts of Countries.

[Chapter I.]

Argentine Republic.
Austria Hungary.
Belgium.
Bolivia.
Brazil.
Cape Colony.
Chile.
Columbia.
Denmark (excluding Iceland and Faroe Islands).
Equador.
France.
Germany.
Gibraltar.
Greece.
Guiana (British).
Guiana (Dutch).
Guiana (French).
Italy.
Malta.
Mexico.
Montenegro.
Morocco.
Natal.
Netherlands.
Norway.
Ottoman Dominions.
Paraguay.
Peru.

Portugal (except Cape Verde Islands, Madeira, and the Azores).
Roumania.
Russia.
Servia.
Spain (except the Canary Islands).
Sweden.
Uruguay.
Venezuela.

Except where otherwise provided a country includes any colony, dependency, or protectorate of the country.

Foreign Animals (Amendment) Order of 1912.

Extension of Certain Provisions of the Foreign Animals Order.

1.—(1.) Any provision of Chapter I. of the Foreign Animals Order of 1910 which relates to an animal brought from a port in a scheduled country shall apply in like manner to a foreign animal brought from a port in a country which is not a scheduled country, if the animal since it was taken on board at that part has entered a port in a scheduled country.

(2.) It shall not be lawful to land in Great Britain, except under the authority and subject to the conditions of a licence granted by the Board, cattle, sheep, goats, or swine taken from the United Kingdom, the Channel Islands, or the Isle of Man into a port in a scheduled country.

Importation (Raw Tongues) Order of 1913.

Disinfection in connection with Importation of Raw Tongues.

1.—Any box or other receptacle and any packing material in which raw bovine tongues shall be brought to Great Britain from any country out of the United Kingdom which is not mentioned in the Schedule to this Order shall, after the tongues have been removed therefrom, forthwith be destroyed by fire by the owner of the tongues at the time of removal, and shall not be permitted to come in contact with any animal.

SCHEDULE.

United States of America.
Commonwealth of Australia.
Dominion of Canada.
Dominion of New Zealand.
Union of South Africa.
Channel Islands.
Isle of Man.

REGULATIONS (1904)

Respecting the shipping of

LIVE STOCK FROM CANADA.

Pursuant to the authority vested in the Governor in Council by the third section of the Act respecting the shipping of Live Stock, 54-55 Victoria, chapter 36, intituled " An Act respecting the shipping of Live Stock," the following regulations are prescribed for ships engaged in the transportation of live stock from any port or place in Canada to any port or place out of Canada, not being a port or place in the United States of America, or in Newfoundland, or in St. Pierre, or Miquelon, or in Bermuda, or in any of the West India Islands, or in Mexico, or in South America.

INTERPRETATION :—The expression " cattle " means bulls, oxen, cows, and heifers one and two years old, and the expression " horses " includes mares.

APPLICATION FOR INSPECTION.

1.—(1.) The master, owner, or agent of every ship intending to take on board live stock for transportation from Canada shall, if such ship requires to be inspected under the provisions of the Act hereinbefore mentioned, apply for inspection in writing to the Inspector of the port at which the live stock is to be shipped, whereupon the Inspector will take the steps necessary to inspect the vessel, and determine whether she is a safe, seaworthy and suitable ship for the transportation of live stock on the voyage intended.

(2.) If the Inspector approves of the vessel he should notify the owner, master, or agent, that he may proceed to fit up the ship as required by these regulations, but if the vessel has been previously fitted for the transportation of live stock, in a manner not consistent with these regulations, the Inspector shall require compliance with these requirements in all respects before issuing his certificate.

(3.) Live stock must not be carried on any part of the vessel where they will interfere with the proper management of the ship, or with the efficient working of the necessary boats, or with the requisite ventilation of the vessel.

CATTLE AND SHEEP.

SPACE.

2.—(1.) Fat cattle carried on the upper or spar deck must be given a space of 2 feet 6 inches clear in width, by 8 feet clear in length, and not less than 6 feet 3 inches in height each ; and in no case shall more than four head of cattle be allowed in each pen, except at the end of a row, where 5 cattle may be allowed together ; provided, however, that 5 cattle each 1,000 lbs. weight or under, commonly known as stockers, may be carried in a pen instead of 4 fat cattle, provided that when 5 stockers are carried in a pen instead of 4 fat cattle, the pen shall not be less than 10 feet 8 inches clear in width. Cows in calf are to be given the same space as fat cattle are given.

In ships fitted with permanent iron fittings with alley-ways not less than 3 feet in width, and fitted with approved and sufficient means of ventilation, fat cattle may be carried on the second deck in a space of 2 feet 6 inches in width, provided that no cattle are carried on the hatches. If cattle are carried on the hatches, the space for each animal in the compartment must be 2 feet 8 inches in width. Cattle carried on the third deck must in all cases have a space of 2 feet 8 inches each in width.

(2.) United States cattle shipped from any port in Canada, carried on the upper or spar deck, must be allowed a space of 2 feet 6 inches in width by 8 feet in depth per head, but such United States cattle when so shipped between decks must be allowed a space of 2 feet 8 inches in width by 8 feet in depth, except in the case of regular cattle ships with satisfactory ventilation, which may fit with an allowance of 2 feet 6 inches in width. No more than four (4) head of cattle will be allowed in each pen, except at the end of a row, where five may be allowed together. Provided, however, that cattle under 1,000 lbs. in weight may be allowed a width of 2 feet 3 inches.

(3.) Pens for sheep shall not be less than 7 feet in height, divided into two equal compartments, and not more than 8 or 10 sheep will be counted equal to one fat ox, according to the discretion of the Inspector.

DECKS.

3.—Cattle shall not be carried on more than three decks ; and every deck on which cattle are carried must be provided with sufficient ventilation as hereinafter prescribed.

UPPER-DECK FITTINGS.

4.—*Stanchions, Wooden.*—Stanchions must be of good sound spruce timber, not less than 3 by 5½ inches, placed at proper distances from centres, against ship's rail, and secured to the rail by a hook of not less than ⅝-inch wrought iron with nutscrew. If the bulwarks are open, the foot of stanchions must be secured by filling pieces 2 x 3 inches placed outside of rail stanchions, to which the outside plankings shall be nailed, and the whole secured by through bolts and nuts. A piece of 2 x 3 inches or 2-inch plank shall be fastened to outside of stanchion and run up to underneath rail to chock stanchion down. Outside stanchion shall extend up sufficient height to form stanchions for a hand-rail where necessary for the protection of the seamen. If the bulwarks are not open, the foot of the stanchion shall be secured by a bracing of 2 x 3 inch sound lumber from the back of each stanchion. Outside stanchions at top of pen shall be properly secured to fore and aft stringer beams or plate not less than 5½ x 2 inches. Inside stanchions must be placed directly in line without board stanchions, to be set up so that the 5½-inch way of the stanchions shall set fore and aft, and properly secured at top to fore and aft stringer beams or plates not less than 5½ x 2 inches, firmly secured at foot to deck and flooring to keep from lifting.

Stanchions, Iron.—These may be used in place of wooden stanchions and should be not less than 2 inches in diameter, set in iron sockets above and below and fastened with nut and bolt.

Beams.—Beams or rafters must be of good sound lumber 2 x 6 inches, suitably placed, to run clear across the ship were practicable. Should any house or deck fittings be in the way, then butt up closely to same. These beams shall be shouldered on the stanchions and made secure with chocks nailed or otherwise properly fastened to stanchions.

Angle Iron Frames.—Angle iron frames fitted from side to side on upper deck, 10 feet 8 inches apart, may be used instead of wooden stanchions and beams.

Head or Breast Boards.—Head boards shall be not less than 1½ x 12 inches, of good sound lumber, and well secured on the pen side of the stanchions. A double stanchion to secure head board shall be set up at each end of pen. A bolt of iron ⅝-inch in diameter shall pass through the double stanchions and head board secured by a nut and a screw. All head boards shall have holes bored through them at proper distances, to tie the animals.

Foot Boards.—Foot boards shall be of the same material as head boards, properly nailed to stanchions on the inside of same.

Division Boards.—Division boards shall be of 1½ inch x 12-inch sound lumber, fitted perpendicularly and arranged so that they divide the animals into pens of four, or, at end of row, into pens of five.

Flooring.—Flooring for the deck shall be of sound 1-inch boards laid fore and aft on scantlings 2 x 3 inches laid athwart ship on the deck at 18-inch centres, and the whole well secured. Where very heavy cattle are stalled thicker flooring should be used.

It is optional with the owners whether they use sheathing on their ships with wooden decks, or whether they secure the footlocks to the decks, but iron decks must in all cases be sheathed. Cement may be used instead of wood sheathing with footlocks moulded in the same.

Footlocks.—Footlocks shall be of good sound spruce or pine lumber, or hard wood, 1½ x 3 inches, laid fore and aft of ship, properly secured to sheathing or deck, placed 17, 16, 22 and 16 inches apart (the first one distant 17 inches from the trough), nailed when practicable with 4-inch nails through into deck strips and braced by similar locks placed athwart 18 inches apart and nailed through to deck strips.

Outside Planking.—All the outside planking on open and closed rail ships must be properly laid fore and aft of ship and nailed to the backs of stanchions, and battened after the 1st November. Nothing less than 1¼-inch spruce or pine is to be used for this purpose.

Planking of Shelter Deck to be erected on upper decks.—The planks or boards to be nailed on this deck should be not less than 1-inch sound lumber 12 inches wide, laid on purlins, with 4 inches of space between the boards; the space to be fitted with a block of 4 by 1 inch at back and front plates or stringers, and at the purlins to give additional support to the second covering, which is to be of boards of the same dimensions, laid over the 4-inch openings of lower boarding.

UNDER-DECK FITTINGS.

Stanchions.—Stanchions shall be of good spruce lumber not less than 3 x 5½ inches set up at proper distances from centres so that the 5½-inch way of same shall stand fore and aft and jammed in tight between the two decks, properly braced on head and from side to side of ship; this bracing shall be of 2 x 3-inch spruce or pine, and be properly butted against each stanchion. Where it is found impracticable to run these braces across ship, by reason of hatches, etc., coming in the way, then they shall be well braced from hatch coamings and from the obstruction which prevents running braces from side to side. The heads of these stanchions shall be braced fore and aft by 2 x 3-inch pieces well nailed on each stanchion and running fore and aft close up to the lower edge of the ship beams and butted at each end of compartment and against themselves, or chocked in underneath beam and well nailed to heads of stanchions. If upper and lower decks are wood then the stanchions set up between decks may be secured by well cleating to each deck by heads and heels of same.

Head or Breast Boards, Foot Boards, Division Boards, Flooring and Footlocks shall be of the same dimensions as those on the upper deck and fastened in the same manner, and shall have holes bored at proper distances to the animals.

Troughs.—Suitable troughs, whether on upper or under decks, shall be formed on the foot boards about 12 inches wide when required. Troughs for sheep must be made watertight.

Casing for Steering Gear.—A suitable casing must be placed over the ship's steering gear when found necessary.

Alley-ways.—Alley-ways between the pens must not be less than three feet wide, except forward and aft, where they may be not less than 18 inches for a distance of 21 feet from the end of the ship inwards, and no feed shall be placed or stowed in the alley-ways. In any case in which more than four rows of cattle are carried, transverse alley-ways shall be made at each end of a compartment and opposite hatches from which food or water is supplied, as may be required by the Inspector.

VENTILATION.

5.—Each compartment containing cattle must have at least four bell-mouthed ventilators, of not less than 18 inches inside diameter, and with top exceeding 7 feet in height, two situated at each end of the compartment, or have some other system of ventilation of which the Inspector approves, but in every case the ship must always be supplied with a sufficient number of fans worked by steam to ensure good and sufficient ventilation for the cattle.

6.—No cattle shall be loaded along the alley-ways by engine-room unless side of said engine-room is covered by 1-inch lumber making a 3-inch air-space between.

7.—No cattle shall be loaded on hatches on decks above cattle, nor shall any merchandise, freight or food for cattle be loaded on said hatches, but said hatches shall at all times be kept clear, but cattle may be carried on the lowest hatch provided that a space on such hatch of 12 feet square be at all times kept clear and free; and no cattle shall be carried on any part of the vessel where in ordinary course of navigation they would interfere with the proper management of the vessel, or would interfere with the efficient working of the boats.

MISCELLANEOUS.

8.—Convenient and suitable stowage shall be provided under deck for feed for cattle; but hay to the extent of 50 pounds for each head of cattle for consumption in the River and Gulf of St. Lawrence may be stowed on deck properly covered, and must be the first hay used. The Inspector must be satisfied as to the quality and quantity of food and water provided for the cattle Hay must be in bales and grain in bags, and bales and bags must be marked in a legible manner with the name of the person who ships the cattle for which the feed is intended, and the cattle shipper shall furnish the Inspector with a statement of the quantity of hay and grain supplied by him, and the number of cattle shipped by him for the intended voyage.

9.—All vessels will carry not less than 4 hogsheads of over 100 gallons capacity for each 100 head of cattle, and these shall be filled with fresh cold water before sailing and re-filled as emptied, unless the vessel is fitted with water-pipes suitably placed and fitted with taps for watering the cattle.

10.—Shippers of cattle will require to furnish a foreman and attendants to take charge of the cattle on board ship, and there shall be one man, including the foreman, for each 25 head of cattle shipped. Shippers are required to notify the Inspector at least twelve hours before the sailing of the ship of the name of the foreman to be in charge of their shipment and of the names of the attendants, and must furnish the Inspector with satisfactory evidence of their sobriety, experience, ability, and general good conduct, and every such foreman and cattle attendant shall sign the ship's articles of agreement before the ship clears on her intended voyage, and be subject to the authority of the master, and the Inspector shall see that the eating and sleeping accommodations for the cattle attendants and foremen are as good as the same accommodations provided for the crew of the ship. Every ship's articles of agreement signed by the foreman and attendants shall clearly state the wages to be paid to each. The foreman and attendants must report themselves to the Inspector at least six hours before the sailing of the ship.

11.—Cattle will be tied with a rope not less than ⅝-inch in diameter, which shall not be used more than once.

12.—False decks on which cattle have been loaded must be removed and the manure and dirt cleaned away before the ship receives another cargo of cattle.

13.—The Inspector may, in case he finds any of the fittings are worn, decayed or unsound, require the same to be replaced before he clears the vessel. He will also supervise the loading of cattle and see that they are properly stowed and tied and that all the requirements of these regulations have been complied with.

14.—Water condensers shall be on board in good working order and of sufficient capacity to provide eight gallons every twenty-four hours of fresh cold water for each head of cattle carried, whether the ship is fitted with water ballast tanks or not.

15.—Live stock shall not be taken on board until the loading of the cargo has been completed, unless the consent of the Inspector in writing to do otherwise is first obtained.

16.—The backs of pens are to be lined with 1-inch boards to the height of 4 feet, nailed to back stanchions on inside, making the backs of the pens flush and smooth, if the Inspector deems it necessary.

17.—The work throughout must be well nailed and strongly put together, and to the satisfaction of the Inspector.

18.—If the ship is not lighted by electric lights, the Inspector should see that sufficient ship's lanterns are provided to light between decks when live stock is carried.

19.—Passages must be left so that the scuppers can be reached and kept clean.

20.—Any disputes arising under these Regulations in regard to providing for the health, security and safe carriage of live stock shall be referred to the

Minister of Marine and Fisheries, who may decide the matter; or the Minister may refer it to any person considered competent by him, and in either event the decision of the Minister or of such person shall be final.

21.—For the better protection of the health of the live stock no cattle or horses shall be taken on board except cattle or horses which have been inspected and passed as regards health by a duly appointed Government Veterinary Inspector.

22.—(Fee, *Abolished* 1901).

23.—(1.) Horses shall not be taken on board until the loading of the cargo has been completed, unless the consent of the Inspector to do otherwise in writing is first obtained.

(2.) Stalls for horses shall not be less than 2 feet 6 inches wide in the clear for horses weighing 1,200 lbs. or less. For horses over 1,200 lbs. in weight, the stall shall not be less than 2 feet 8 inches in the clear. In every case the stall must be 8 feet deep.

(3.) The materials used in the construction of stalls and fittings shall be of a substantial character and of such dimensions as the Inspector deems necessary.

(4.) The Inspector shall see that a sufficient supply of good food is placed on board ship for each horse and that suitable arrangements are made for a sufficient supply of fresh water, so that no condensed water shall be used. The food supply shall not be less than 15 pounds of hay, 7 pounds of bran, and 3 pounds of oats for each horse per day, and the Inspector may refuse to issue the certificate rendered necessary under the Act above referred to until the Inspector is satisfied as to the quantity and quality of the food on board for horses.

(5.) Shippers of horses will require to furnish attendants to take charge of horses on board ship and there shall not be more than eighteen horses in charge of one attendant. Shippers are required to notify the Inspector at least twelve hours before the sailing of the ship of the names of the attendants, and must furnish the Inspector with satisfactory evidence of their sobriety, experience, ability and general good conduct, and every attendant shall sign the ship's articles of agreement before the ship clears on her intended voyage, and be subject to the authority of the master, and the Inspector shall see that the eating and sleeping accommocations for the attendants are as good as the same accommodations provided for the crew of the ship. Every ship's articles of agreement signed by the attendants shall clearly state the wages to be paid to each. The attendants must report themselves to the Inspector at least six hours before the sailing of the ship.

F. GOURDEAU,
Marine and Fisheries.

REGULATIONS GOVERNING THE INSPECTION, HUMANE HANDLING AND SAFE TRANSPORT OF ANIMALS CARRIED BY OCEAN STEAMERS FROM THE UNITED STATES TO FOREIGN COUNTRIES.

U.S. DEPARTMENT OF AGRICULTURE.

Dec. 1st, 1906, and in force 1913.

GENERAL PROVISIONS.

Regulation 1.—No cattle, sheep, swine, or goats shall be exported from the United States to any foreign country unless and until the same have been inspected and found free from disease or exposure thereto by an inspector of the Bureau of Animal Industry of this Department; and unless the Secretary of Agriculture shall have waived the requirement of a certificate of inspection for the particular country to which such animals are to be exported no clearance shall be issued to any vessel carrying such animals, unless and until a certificate of inspection showing freedom from disease

or exposure thereto shall have been issued by the Department of Agriculture. The requirement of a certificate for shipments of such animals to Cuba, the West Indies, Mexico, Central America, and the countries of South America, excepting Argentina and Uruguay, is hereby waived.

PLACES OF INSPECTION.

The inspection provided for in this regulation will be made at any of the following-named stock yards: Chicago, Ill.; Kansas City, Mo.; Omaha, Nebr.; South St. Joseph, Mo.; National Stock Yards, Ill.; Indianapolis, Ind.; Buffalo, N. Y., and Pittsburg, Pa., and at the following ports of export: Portland, Me.; Boston, Mass.; New York, N. Y.; Philadelphia, Pa.; Baltimore, Md.; Norfolk and Newport News, Va.; Port Royal, S. C.; New Orleans, La., and Galveston, Tex. All animals will be inspected at ports of export, regardless of the fact that they may or may not have been inspected at the above-named stock yards.

HORSES.

Regulation 2.—Horses shall be entitled to the inspection provided for in these regulations, and certificates shall be issued whenever required by the country to which the horses are to be exported, but horses may be shipped without inspection and certification, at shipper's risk, to countries which do not demand such inspection and certification as a prerequisite to admission.

DEFINITION OF TERMS.

Regulation 3.—Whenever in these regulations the following words, names, or terms are used, they shall be construed as follows:

Inspector of Port, Inspector, Assistant, Employee.—These terms shall mean, respectively, the inspector in charge of the Bureau of Animal Industry stationed at the port from which the animals are to be exported, and inspectors, assistants, and employees of the Bureau of Animal Industry.

Lumber.—This word, unless otherwise stated, shall mean hard pine, spruce, oak, or other hardwood.

Animals.—This word refers to cattle, sheep, swine, and goats, also horses, unless it is inapplicable to them under Regulation 2.

Horses.—This word shall include mules and asses.

INSPECTION AND SHIPMENT.

Regulation 4.—Only animals found to be healthy and free from disease and shown not to have been exposed to the contagion of any disease shall be allowed shipment, and all animals inspected and passed shall be loaded into clean and disinfected cars.

All animals shall be inspected or reinspected at the port of export. Railroad companies will be required to furnish clean and disinfected cars for the transportation of animals for export, and the proprietors of the various stock yards and stables located at the ports of export shall keep separate, clean, and disinfected stock yards and pens or stables for the use of export animals.

IDENTIFICATION OF ANIMALS AND NOTIFICATION OF SHIPMENT.

Regulation 5.—Shippers shall notify the Inspector in charge of the yards of intended shipments of animals and the number and designation of cars in which they are to be shipped, and shall inform said Inspector of the locality from which said animals have been brought, and the name of the feeder of said animals, and shall furnish such other information as may be practicable for the proper identification of the place from which said animals have come.

Regulation 6.—The Inspector after passing said animals shall notify the Inspector in charge of the port of export, and Inspectors located at intermediate cities where the animals may be unloaded for feeding and watering, of the

inspection and shipment of such animals, the number and kind of animals shipped, and the numbers and designations of the cars containing them.

TRANSPORTATION FROM YARDS TO STEAMERS.

Regulation 7.—Export animals shall not be unnecessarily passed over any highway or removed to cars or boats which are used for conveying other animals. Boats transporting said animals to the ocean steamer must first be cleansed and disinfected with limewash under the supervision of the Inspector of the port, and the ocean steamer shall, before receiving said animals, be thoroughly cleansed or disinfected in accordance with the directions of said Inspector. When passage upon or across the public highway is unavoidable in the transportation of animals from the cars to the boat it shall be under such careful supervision and restriction as the Inspector may direct.

ANIMALS NOT ALLOWED SHIPMENT.

Regulation 8.—Any animals that are offered for shipment to a foreign country which have not been inspected and transported in accordance with these regulations, or which, having been inspected, are adjudged to be infected or to have been exposed to infection so as to be dangerous to other animals or to be otherwise unfit for shipment, shall not be allowed upon any vessel for exportation.

SUPERVISION TO STEAMERS—CLEARANCE PAPERS.

Regulation 9.—The supervision of the movement of animals from cars, yards, and stables to the ocean steamer at the port of export will be in charge of the Inspector of the port.

The Inspector at the port of export shall notify the collector of the port, or his deputy, of the various shipments of animals that are entitled to clearance papers.

NOTIFICATION TO INSPECTORS OF INTENDED SHIPMENTS ON STEAMERS.

Regulation 10.—The exporters of animals or the owner, agent, or master of any vessel desiring to transport animals from any port of the United States to a foreign country shall notify the Inspector in charge of the port from which said vessel is to clear of such intended shipment at least two days in advance thereof, and if the regulations prescribed have been complied with a clearance shall be authorised by such Inspector.

SPACE ON VESSELS.

Regulation 11.—Export animals must not be carried on any part of the vessel where they will interfere with the proper management of the vessel, or with efficient working of the necessary lifeboats, or with the requisite ventilation of the vessel, and may be carried only as hereinafter specified.

CATTLE.

Regulation 12.—Cattle must have 6 feet vertical space on all decks, free of all obstructions; cattle may, however, be placed on raised floors over pipes and other similar obstructions where the vertical space is 5 feet 6 inches. Cattle carried on the upper or other exposed decks must be allowed a space of 2 feet 6 inches in width by 8 feet in depth per head. Cattle loaded under decks must be allowed a space of 2 feet 8 inches in width by 8 feet in depth, except in the case of regular cattle ships with satisfactory ventilation, which may fit with an allowance of 2 feet 6 inches in width.

No more than four head of cattle will be allowed in each pen, except at the ends of a row, where five may be allowed together. Cattle in single stalls shall be allowed 3 feet in width. Cattle standing between stanchions, sounding tubes, ventilators, and other obstructions, though in continuous pens, must be allowed 3 feet in width. Vessels will be allowed to carry three deck loads of cattle, but where it is desired to carry cattle on the lower or steerage deck, said deck must in all cases be fitted at 2 feet 8 inches and no animals allowed upon hatches. Special permission for carrying cattle on the steerage deck must be obtained from the Inspector, and will be granted in cases where said deck is provided with sufficient ventilation as hereinafter prescribed.

SHEEP AND GOATS.

Regulation 13.—The space for each sheep or goat shall be 4 feet long by 14 inches wide, and for lambs or goats under 100 pounds in weight 4 feet by 12 to 13 inches.

Sheep pens shall not exceed 20 feet by 8 feet, where two tiers are carried, and each tier shall have a clear vertical space of not less than 3 feet. During the summer season sheep shall not be loaded in tiers under decks, but during the winter season two tiers may be placed in each wing and only one tier amidships. One single deck of sheep may be carried upon the shelter decks for cattle when said decks are permanently built and are composed of tongued-and-grooved boards, provided such sheep fittings do not conflict with regulation 12. Sheep pens on shelter deck shall not exceed 12 feet in width and must be supplied with athwartship partitions every 14 feet. Such fittings shall be secured to the shelter deck in the manner provided by regulation 41.

SWINE.

Regulation 14.—The space for swine not exceeding 150 pounds in weight shall be the same as that specified for full-grown sheep and goats, and for those under 100 pounds in weight the same as for lambs and for goats of less than 100 pounds in weight. Additional space shall be required by the Inspector for unusually large hogs.

HORSES.

Regulation 15.—All horses must have 6 feet 3 inches clear vertical space from beams of deck overhead to deck underfoot, and, so far as possible, shall be placed between the overhead athwartship beams. Each horse must be allowed a space of 2 feet 6 inches in width by 8 feet in depth, and additional space shall be required by the Inspector for very large horses.

Separate stalls must be erected for all horses. When horses are placed directly under athwartship beams, the beams must be guarded by 4-inch strips of wood. A space 8 by 10 feet square must be reserved on each steamer carrying 22 or more horses for use in caring for horses becoming sick in transit. When placed in the same compartment with cattle, horses must be separated by fore-and-aft alley-ways and temporary athwartship bulkheads, the length of which shall not be less than the depth of the stalls.

UPPER-DECK FITTINGS.

Regulation 16.—No animals shall be allowed on the poop deck or within 20 feet of the breakwater on the spar deck, between the 1st of October and the 1st of April, except on ships provided with houses constructed of iron in each wing and of sufficient width and height to protect the fittings, when the fittings may be constructed to abut such houses. Horses shall not be allowed upon the bridge deck, except when this deck is watertight and completely covered in and fitted for horses. Horses shall not be allowed upon the spar deck when temporary fittings are used. No cattle or horses shall be carried upon the upper decks where the outside rails are not of sufficient strength to hold fittings securely and measure less than 3 feet in height from the deck. When animals are carried upon the upper decks, strong breakwaters shall be erected at each end and on both sides. Permanent fittings may be constructed either of iron or wood, as hereinafter specified.

ALLEY-WAYS.

Regulation 17.—All steamers engaged in carrying animals for export will be required to provide alley-ways as provided by this regulation. Alley-ways in front of and between pens used for feeding and watering cattle must have a width of 3 feet, except at end of alley-ways in bow and stern of ship, and where obstructions less than 3 feet in length occur the width may be reduced to a minimum of 18 inches. Alley-ways in front of and between pens used for feeding and watering horses must have a minimum width of 3 feet. Two or more athwartship alley-ways at least 18 inches wide must be left on each side of upper decks, so that the scuppers can be readily reached and kept clear of obstructions. For sheep and goats athwartship alley-ways not less than 18 inches wide in the clear shall be left between pens and fore-and-aft alley-ways 3 feet wide in front of each pen, except that at obstructions and at ends of alley-ways, as provided for cattle, there may be a minimum width of 18 inches. Sufficient space must be left at the sides of hatches to permit the feed in the hold to be readily removed and handled.

WOODEN STANCHIONS AND RUMP BOARDS.

Regulation 18.—Stanchions at least 4 inches higher than the required vertical space for cattle and horses must be of 4 by 6 inch clear hard pine or good sound spruce, set 6 feet from centres against the ship's rail, and inside stanchions in their proper place must be directly in line with outboard stanchions and set up so that the 6-inch way of the stanchions shall set fore and aft. A proper tenon, not less than 4 inches in length, shall be cut on the head of the same to receive the athwartship beam. A piece 2 by 3 inches, or 2-inch plank, shall be fastened to the outside of the stanchion and run up to underneath the rail to chock down the stanchion and prevent lifting when the beam is sprung to the crown of the deck. Open-rail ships shall be blocked out on backs of stanchions fair with the outside of rails to receive the outside planking. Where upper-deck fittings are not permanent, the heels of outside stanchions shall be secured by a bracing of 2 by 3 inch lumber from the back of each stanchion to sheer streak of waterway, the heels of inside stanchions being properly braced from and to each other. Bulwark stanchions must also be extra braced by raking shores running diagonally from the top of the stanchions to the deck.

Rump boards must be provided on all decks, and when covering bitts, rigging, or other obstructions located at a distance from ship s side, must have fittings built 8 feet from said obstruction, with a solid partition built behind the cattle, not less than 5 feet high from deck, to prevent injury to the animals; and when necessary to extend fittings opposite bitts, etc., two or more cattle must be brought forward. Rump boards in such cases shall be 1½ inches thick. For horses, wooden stanchions as above described must be placed at proper distances from each horse.

IRON STANCHIONS.

Regulation 19.—Iron stanchions may be used in place of wooden stanchions and shall not be less than 2 inches in diameter, set in iron sockets above and below, and fastened with ⅝-inch bolts. For horses the same number of iron stanchions are required as when wooden stanchions are used.

HOOK BOLTS OR CLAMPS.

Regulation 20.—Hook bolts or clamps must be made of ⅝-inch wrought iron, with hook on outboard end and thread and nut on inboard end to pass over and under rail and through outboard stanchion and set up on the inside of same with a nut. These bolts may be double or single. If double, no thread or nut is necessary, but the stanchion will lie shipped through it, thus double-

hooking the rails. This will be found very useful where funnels or other deck fittings come in the way of beams passing from side to side of ship.

BEAMS.

Regulation 21.—Beams must be of good sound spruce or hard pine lumber, 4 by 6 inches, to run clear across the ship's beam where practicable. Should any house or deck fittings be in the way, the beams should butt up closely to the same. These beams shall have a 2 by 4 inch mortise to receive the tenon of each and every stanchion and to take the same crown as deck of ship by springing down to shoulder of outside stanchion and to be properly pinned or nailed to tenon and wedged tightly afterwards. The mortises shall be cut not less than 6 inches from outside ends of beams.

BRACES.

Regulation 22.—Diagonal braces shall be fastened on each stanchion on both sides of same, running up to top side of beam and properly secured by well nailing to both stanchions and beam.

HEAD BOARDS.

Regulation 23.—Head boards shall be not less than 2 by 10 or 2½ by 9 inches, of good clear spruce or hard pine lumber, and secured at every stanchion by ⅝-inch screw bolts passing through same and set up with nuts. When 3 by 9 or 3 by 10 inch head boards are used, stanchions may be set at distances not exceeding 8 feet. Where head boards butt on the stanchions, a piece of iron one-quarter of an inch thick and 3 inches square shall be placed over the boards like a butt strap. These head boards shall have 1¼-inch holes bored through them at proper distances for tying the animals; provided, however, that on all open decks stanchions must not be placed more than 6 feet from centre to centre.

HEAD PIPES.

Regulation 24.—In place of wooden head boards, two wrought-iron pipes not less than 2 inches in diameter may be used, placed 8 inches apart. Such head pipes must be made continuous by having a wrought-iron threaded collar securely fastened on the end of each length of pipe into which the next length may be inserted or secured. Both head pipes must be held in place by means of having wrought-iron straps bolted to each stanchion by four ⅝-inch bolts. The lower head pipe shall be fitted with movable clamps, holding a ring of suitable size to which cattle may be tied; said clamps shall be set at the proper distance apart, in accordance with these regulations, and fastened to the pipe with screws.

FOOT BOARDS.

Regulation 25.—Foot boards shall be of wood and of the same dimensions as head boards, and shall be properly nailed or bolted to stanchions.

DIVISION BOARDS.

Regulation 26.—Division boards for cattle shall be 2 by 8 inch sound spruce or hard pine, and so arranged as to divide the animals into lots of four, except at the ends of rows, thus making compartments for this number all over the vessel. These division boards shall be fitted perpendicularly.

DIVISION PIPES.

Regulation 27.—In place of wooden division boards, three wrought-iron pipes not less than 2 inches in diameter may be used, placed 6 inches apart athwartship, set in iron sockets above and below, and fastened with ⅝-inch bolts.

DIVISION BOARDS FOR HORSES.

Regulation 28.—Division boards for horses shall not be less than 2 by 9 inches by 8 feet, and shall be of sound lumber, planed, and placed horizontally between the horses.

FLOORING.

Regulation 29.—Ships with iron decks shall be sheathed with 1-inch or 2-inch spruce or hard pine, but if 1-inch lumber is used the foot locks shall be 3 by 4 inches and laid so that they will properly secure the 1-inch boards, thus preventing them from slipping and at the same time acting as foot locks by showing a surface of 2 by 4 inches. It is optional with the owners whether they permit sheathing to be used on their ships with wooden decks, or whether they allow foot locks to be secured to the deck, but it is absolutely necessary to sheath iron decks before putting down foot locks in order to fasten same. Cement, diagonally scored, ⅜-inch deep, may be used on iron decks instead of wood sheathing, if the foot locks be moulded in the same and bolted to the deck. If the flooring is raised on any of the decks, it shall not be less than 2 inches thick, with scantlings 2 by 3 inches, laid athwartships on the deck, not over 18 inches apart, with 2-inch plank for flooring nailed to them.

FOOT LOCKS.

Regulation 30.—Foot locks shall be of good sound spruce, hard pine, oak, or other hard wood, size 2 by 4 inches, laid flat down and fore-and-aft, placed 12 inches, 14 inches, 2 feet 2 inches, and 14 inches apart, the first one distant 12 inches from the inside of foot-board. Where temporary fore-and-aft locks are used, they shall be filled in athwartships opposite each stanchion, properly secured to sheathing or deck, and secured by a batten of spruce or hard pine 2 by 3 inches thick to go over all from stanchion to stanchion. Pieces of 2 by 3 inches must be nailed on stanchion over batten to prevent floor raising. Where permanent foot locks, securely bolted to decks, are used, the athwartship braces between foot locks from stanchion to stanchion and batten may be omitted when the stanchion is securely fitted in iron socket bolted to the deck. When troughs are used, fore-and-aft foot locks will be placed 17, 16, 22, and 16 inches apart. A space of 2 inches may be left between the ends of athwartship foot locks and fore-and-aft foot locks when the former are securely bolted to the deck. When fore-and-aft foot locks are permanent, a 2-inch space shall be left between ends at end of each section. Vessels now fitted with 3 by 4 inch foot locks will not be required to use 2 by 4 inch foot locks except when the former are replaced.

OUTSIDE PLANKING.

Regulation 31.—All outside planking on open and closed rail ships must be properly laid fore and aft of ship and nailed to the backs of stanchions as close as possible for the cold season, and for the warmer months the top-course planking shall be left off fore and aft of ship in order to allow a free circulation of air. Nothing less than 1¼-inch spruce or hard pine is to be used for this purpose.

SHELTER-DECK PLANKING

Regulation 32.—The planks to form the shelter deck, which must be erected on all exposed decks, shall be laid with 1¼-inch sound spruce or hard pine lumber, sufficient to cover cattle. These planks shall be laid as closely as possible and shall be well nailed to the beams, thus making a good deck from which to work the ship's gear.

CATTLE FITTINGS OVER SPAR DECK.

Regulation 33.—No cattle fittings shall be erected over permanent spar-deck fittings forward and aft of the midship section until permission has been obtained from the Chief of the Bureau of Animal Industry.

UNDER-DECK FITTINGS.

ALLEY-WAYS.

Regulation 34.—Alley-ways on under decks shall be of the same dimensions as the alley-ways of the upper decks.

STANCHIONS.

Regulation 35.—Stanchions on under decks shall be of clear hard pine or good sound spruce, 4 by 6 inches, set 6 feet from centres, so that the 6-inch way of same shall stand fore and aft, and jammed in tight between the two decks, securely braced with 2 by 3 raking shores from stanchion to stanchion and sides of ship. If upper and lower decks are wood, then the stanchions set up between decks may be secured by well cleating to each deck at heads and heels of same.

HEAD BOARDS, ETC.

Regulation 36.—Head boards, foot boards, division boards, flooring and foot locks of the under decks shall be of the same dimensions and materials as those of upper decks and shall be fastened and arranged in the same manner.

TROUGHS.

Regulation 37.—Suitable troughs may be built on the foot boards about 12 inches wide, when required for cattle, on either deck by fastening foot boards on outside of stanchions and fitting up on the inside. When it is desired to feed small grain or ground feed the trough shall be raised above the decks to prevent the feed from becoming wet. Removable troughs must be used for feeding horses. Suitable troughs for grain and water must be provided on three sides of each sheep, goat, or hog pen.

PENS AT ENDS OF HATCHES.

Regulation 38.—When pens run up to the ends of hatches two athwartship planks must be so placed as to prevent cattle from getting out of such pens.

PROTECTION FROM HEAT OF BOILERS.

Regulation 39.—No animals shall be loaded along the alley-ways by engine and boiler rooms, unless the sides of said engine and boilder rooms are covered by a tight-sheathing, making a 3-inch air space.

CASING FOR STEERING GEAR.

Regulation 40.—Suitable casing must be placed over the ship's steering gear when found necessary.

SHEEP AND GOAT PENS.

SHELTER DECK.

Regulation 41.—Only a single tier of sheep and goats may be carried on the shelter deck. Stanchions shall be not less than 4 by 4 inch spruce or hard pine set 5 feet on centres, with 1½-inch shoulder to be gained on stanchions to receive rafters. Rafters shall be 3 by 6 inch spruce or hard pine set on edge and bolted to stanchions with ⅝-inch bolts. Planking shall be not less than 1¼-inch tongued-and-grooved spruce or hard pine. Troughs must be constructed of three pieces of 1 by 6 inch lumber nailed together securely. Hayracks shall be made of 1 by 2 inch lumber and built in pens fore and aft and on athwartship partitions. Battens shall be nailed on the deck of the same dimensions as under deck, to act as foot locks. Battens on front and ends of pens shall be of 1 by 6 inch spruce or hard pine lumber and sufficient in number to properly secure the sheep or goats in the pens.

UPPER DECK.

Regulation 42.—Sheep and goat pens on upper deck shall be built with the same size and quality of lumber as cattle fittings upon upper deck. Flooring between tiers shall be of the same dimensions as under-deck fittings. Troughs and hayracks shall be the same as provided in regulation 41.

UNDER DECK.

Regulation 43.—When the pens for sheep and goats on under deck are built for two tiers, joists not less than 3 by 4 inch spruce or hard pine must be used, supported in centres by 2 by 3 inch pieces run from deck to underside of joists securely nailed to same. The flooring shall be not less than ⅞-inch tongued-and-grooved spruce or hard pine, and 1 by 2 inch battens shall be laid fore and aft on flooring, 18 inches apart, to act as foot locks. Stanchions may be made of 4 by 4 inch spruce or hard pine lumber. Troughs and hayracks shall be of the same dimensions as provided in regulation 41.

VENTILATION.

Regulation 44.—Each under-deck compartment not exceeding 50 fee in length must have at least four bell-mouthed ventilators of not less than 18 inches in diameter and with tops exceeding 7 feet in height above shelter deck, two situated at each end of the compartment. Compartments over 50 feet long must have additional ventilators of the same dimensions or efficient fans.

SPAR DECK.

Regulation 45.—When the fittings on the spar deck are permanent and hatches overhead are provided, the same regulations for ventilation shall apply as provided for under decks.

THIRD DECK.

Regulation 46.—When it is desired to carry animals upon the third deck, written permission must be obtained from the Inspector of the port. The vessel must be fitted as hereinbefore specified, lighted with electric lights, and properly ventilated. One set of ventilators should be trimmed to the wind and another set in the opposite direction. The ventilators must be tested and kept in easy working order.

HATCHES.

Regulation 47.—No cattle, swine, sheep, or goats shall be loaded upon hatches on decks above animals nor upon third deck hatches when animals are carried upon such deck, nor shall any merchandise, freight, or feed for animals be loaded upon said hatches, but said hatches shall at all times be kept clear. In loading animals upon upper decks, four of the hatches shall be kept free of animals, one forward and one aft, and the intervening hatches must be so fitted as to afford an equalisation of ventilation. Horses shall not be allowed upon any hatches under any circumstances.

No cattle shall be loaded upon any hatch where the coamings exceed 18 inches in height in centre of hatch. There shall be not less than 5 feet 6 inches vertical space between the beams overhead and the flooring placed on hatches underfoot.

LIGHTING.

Regulation 48.—All vessels designated as cattle ships must provide at all times electric lights for the proper attending of all animals.

FEED AND WATER.

Regulation 49.—All vessels not provided with pipes for watering animals shall carry casks or hogsheads of not less than 400 gallons total capacity for each 100 head of cattle and horses, and an additional amount in equal proportion shall also be carried for sheep, and these shall be filled with fresh water before sailing and refilled as emptied. All water tanks for use of animals must be filled with good fresh water before sailing.

Each vessel shall carry water condensers which are in good working order and of sufficient capacity to provide 8 gallons of fresh cold water each twenty-four hours for each head of cattle, in addition to the amount required by other animals on board and for other purposes.

Regulation 50.—Not more than two days' feed for the animals shall be allowed to be carried on the shelter deck, and no feed shall be carried on the shelter deck when same interferes with the proper care of sheep; neither shall any feed be stored on top or inside of sheep pens. When feed as above provided is placed on the shelter deck, it must be properly covered and shall be the first feed used. All other feed shall be under hatches, and so far as possible shall be placed in the holds contiguous to the animals on board.

ATTENDANTS.

EMPLOYMENT AND CHARACTER.

Regulation 51.—The employment of all attendants shall be subject to the approval of the Inspector of the port, and men so employed shall be reliable and signed as a part of the ship's crew and under the control of the captain of the vessel. They shall be furnished with well-lighted and well-ventilated quarters and with bedding and table utensils. Experienced foremen shall be in charge of the animals, and not less than one-half of the attendants must be experienced men who have made previous trips with stock.

The shippers of export animals, or their agents, shall make affidavit concerning the character of the attendants. The attendants shall be assembled a sufficient time before the sailing of the steamer for an employee of this Department to examine them. The examination shall be made before the signing of the ship's articles by the attendants, and any man who fails to conform to the following conditions shall be rejected: (1) The men employed must be able to speak English sufficiently to make themselves understood, or to understand orders given them; (2) they must know for what purpose they are employed and the duties that will be required of them; (3) they must be able-bodied and physically competent to perform the duties required; (4) each man entitled to return passage shall be supplied with return transportation before acceptance, unless he informs the Inspector that he does not wish to return. The Department has no control over the return of cattlemen. Inspectors in charge of the ports are directed to carefully enforce the above regulations.

When attendants are found to be incompetent, intemperate, or otherwise unfit to properly care for the animals, the captain of the vessel is requested to report the fact to the Inspector of the port.

CATTLE ATTENDANTS.

Regulation 52.—There shall be one attendant for each 35 head of cattle, not including foremen, upon steamers having water pipes extending the entire length of both sides of compartments; and upon steamers not so fitted there shall be one attendant for each 25 head of cattle shipped. Provided, however, that when all the attendants are experienced and capable men, there shall be one attendant for each 50 head of cattle upon steamers having water pipes extending the entire length of both sides of compartments, and not less than 3 feet in width of alley-ways, if a competent watchman for night duty for each shipper is furnished in addition; and upon steamers not so fitted there shall be one experienced attendant to each 35 head of cattle shipped, together with watchmen as provided above.

SHEEP AND GOAT ATTENDANTS.

There shall be one man in charge of each 150 head of sheep and goats during the winter season (October 1 to April 1), and one to each 200 sheep and goats during the summer season.

HORSE ATTENDANTS.

For horses there shall be one attendant to each 22 head.

ADDITIONAL HELP.

There shall also be additional help furnished by the captain of the vessel when water has to be pumped by hand.

REST, LOADING, INSPECTION, CERTIFICATES, ETC.

REST BEFORE EMBARKATION.

Regulation 53.—No vessel shall be permitted to take on board any cattle, sheep, swine, or goats unless the same have been allowed at least five hours' actual rest in the yards at the port of embarkation before the vessel sails, nor until the loading of the other cargo has been completed.

The phrase "actual rest," as applied to live stock in transit for export, must not be interpreted to include any of the time occupied in unloading animals from the cars, or in their inspection, handling and roping, or in loading them on the cars again for transportation to steamer.

All animals must remain a sufficient length of time in stables or yards during daylight at the port of embarkation before the vessel sails, for the purpose of inspection.

No vessel shall be permitted to take on board any horses which have been shipped over 500 miles unless the same have been allowed at least eighteen hours' actual rest in the stable or stables designated by the Inspector for export horses at the port of embarkation before the vessel sails. Horses shipped less than 500 miles shall remain in such stables or yards as the Inspector may designate not less than six hours for the purpose of inspection and rest. Horses shall not be placed upon steamers until the loading of the other cargo has been completed.

LOADING, ETC.

Regulation 54.—The Inspector, or one of his assistants, shall supervise the loading of the animals and see that they are properly stowed, and, as far as practicable, tied; that a sufficient amount of good, wholesome feed is properly stowed; and that all the requirements of these regulations have been complied with. In case the regulations have not been complied with, he shall immediately notify the Chief of the Bureau of Animal Industry. In hot weather the tying of the cattle may, in the discretion of the Inspector, be in part omitted until after the steamer has cleared and is in motion.

CERTIFICATES OF INSPECTION.

Regulation 55.—The Inspector at the port of shipment shall issue certificates of inspection for cattle, sheep, swine, and goats, which are to be exported to any foreign country, unless the Secretary of Agriculture shall have waived the requirement for such certificate of inspection for export to the particular country to which such animals are to be shipped. Each certificate shall cite the name of the shipper, the name of the consignee, and the destination. The certificates shall be issued in serial numbers; only one certificate shall be issued for each consignment, unless otherwise directed by the Chief of the Bureau of Animal Industry. The certificates shall be delivered to the chief officer of the vessel upon which said consignment of live stock is to be transported after the loading and stowing is completed, and continue with the shipment to destination, where it may be delivered to the consignee.

DEFECTIVE FITTINGS.

Regulation 56.—The Inspector may, in case he finds that any of the fittings are worn, decayed, defective in construction, or appear to be unsound, require the same to be replaced before he authorises the clearance of the vessel.

CLEANSING OF FALSE DECKS AND TEMPORARY TROUGHS.

Regulation 57.—False decks upon which cattle are loaded and temporary feed troughs must be removed and the manure and dirt cleaned from underneath before receiving another load of cattle.

HEAD-ROPES, ETC.

Regulation 58.—Cattle shall be tied with ¾-inch rope, which shall not be used more than once, and must be either manila or sisal.

All head-ropes, halters, blankets, stable utensils, feed bags, and feed troughs, if returned to this country, must be disinfected under the supervision of the Inspector of the port, unless an affidavit is furnished by the captain of the vessel that the same have been disinfected, describing the manner of disinfection, or unless such affidavit is furnished by the proper official at the port where the animals are unloaded.

INJURED ANIMALS.

Regulation 59.—Animals suffering from broken limbs or other serious injuries during the voyage shall be slaughtered by direction of the captain of the vessel.

CAVIARE.— An article of food prepared principally in Russia, from the salted roes of certain large fish such as the sturgeon, etc.

Packed in kegs, 20 cwt. stow in 50 feet.

CELERY SEED.—Shipped only in small quantities. 20 cwt., in bags, stow in 76 feet.

CEMENT.—There are many kinds of cement of various compositions, but all may be summed up under three heads:—Hydraulic and Stony, Asphaltic or Bituminous, Resinous and Oily, the first-named being that usually known to commerce. When working cement all articles round about the place should be covered up or removed, if liable to damage by the dust, which is unavoidable.

Steamers loading it as ballast do not usually place dunnage below, but vessels should not neglect this precaution, otherwise they might be held responsible for any damage that may take place.

Casks of cement weigh 360 lbs. each, and measure 6 feet 6 inches each.

Ordinary, one ton of 20 cwt., in casks, stows in 46 feet.

Portland, 20 cwt., in casks, 35 to 37 feet.

The casks should be stowed so that the cross pieces on the heads are up and down.

CHALK.—Generally shipped in barrels, 20 cwt. stow in 38 feet.

CHANK.—A shell, considered valuable. When clean, dry, and free from smell can be stowed below.

20 cwt. stow in about 120 feet.

CHARCOAL, CARBON.—Ivory, bone black, animal, and wood charcoal is not properly made under a temperature of 500°. Willow, Beech, Oak, Maple, and Chestnut furnish the best descriptions of Coal. Charcoal kept dry for a day after being made, out of contact with the air, then ground down to powder and exposed, will ignite by spontaneous combustion.

Small vessels loading any quantity of this article should guard against the increase of weight. It is said to absorb 20 per cent. of moisture on the voyage.

Charcoal dust will damage other goods.

It is estimated that 100 tons of ordinary charcoal will occupy the same space as 200 tons of coke.

CHARTER PARTY.—There are no fixed forms for such documents, each trade having found it necessary to insert clauses to protect its own interests. Masters should never sign one without first consulting their owners, after which they should read over every word, and obliterate any objectionable clause. It is not possible to give any clear idea here of such intricate agreements.

(*See* "Oliver's Shipping Law Manual, 1896.")

CHEESE.—In stowing cheese do not allow any rough handling. If possible avoid moving them about after once being stowed in their place. Loose cheese should never be used for blocking off other goods of a heavy nature. If a large quantity be stowed together, cheese boards should be used to keep undue pressure off those in the wings and underneath. When at sea and the ship rolling heavily, the under cheeses, if not in cases, are often found to be much damaged and crushed. This can generally be avoided by care in the stowing, and by supporting each height as above, with boards.

Cheese will damage if carried near tar, tarpaulins, turpentine, etc.

Dutch cheese is liable to damage if stowed more than two deep.

Cheddar cheeses are packed in boxes which contain 6 cheeses of about 12 lbs. each.

American boxes weigh from 49 lbs. to 80 lbs., and measure 1 ft. 1 in. to 2 ft. 2 ins. The following measurements were taken alongside the steamer in New York:—

Cheese box weighing	48 lbs.	16 by	16 by	9	about 1 ft. 4 ins.
,, ,,	67 lbs.	16 by	15 by	12	,, 1 ft. 8 ins.
,, ,,	75 lbs.	18 by	17 by	11	,, 1 ft. 11 ins.
,, ,,	80 lbs.	17 by	17 by	13	,, 2 ft. 2 ins.

20 cwt. of cheese should stow in about 70 feet.

CHICORY.—Chicory may be divided into four kinds, viz., crude, dried, roasted, and ground.

Dried Chicory is sometimes shipped in bulk in small vessels. Chicory will become mouldy in a damp place. Dried Chicory is not liable to damage other goods if carefully stowed.

Roasted and ground chicory are generally packed in cases (containing tins of 56 lbs. each) and weigh from 1 to 2 cwt. each; casks 7 cwt. each; sacks 1 cwt. each.

20 cwt. of chicory, in sacks, stow in about 60 feet.

CHILLIES.—In bags or robins.

Green chillies in baskets require lots of ventilation, and may generally be treated much the same as green fruit.

20 cwt., in baskets, stow in 150 feet.

CHINA CLAY.—Shipped in bulk and in casks.

In bulk 40 cubic feet to a ton. Casks stow in 55 to 60 cubic feet to a ton.

CHINA OIL.—In cases of 4 tins, 12 cases to a ton. One case contains 10 gallons and is valued at about $9. (*See* **Oil.**)

CHINA ROOT.—A kind of Sarsaparilla, packed in bags or casks. 20 cwt. stow in 95 feet.

China Root from Canton, shipped in baskets (to India) which measure 5 to 8 feet. Nett weight 1 to 1½ picul. Value per picul $7 to $12.

CHINAWARE.—Packed in crates, barrels, and cases; no fixed weight. Often shipped in rolls (packed in straw) about 2 feet per roll. Careful special stowage required to avoid extensive breakage when shipped in this way.

CHIRETTA.—A plant used for medicinal purposes. It is packed variously in bales and bundles. 20 cwt. stow in 95 feet.

CHLORIDE OF LIME.—Chlorinated Lime, a compound of lime and chlorine. Made by passing chlorine gas over slaked lime. It is a dull white powder with a feeble odour of chlorine; partially soluble in water. Bleaches and disinfects, and is one of the most powerful disinfectants, deodorisers, and decolorisers known. It is much used to purify cabins, wash infected clothes, flush closets and drains, and disinfect the stools of fever and cholera patients, etc.

Chloride of Lime is usually packed in lead-lined cases. It should never be stowed among dry goods. (*See* **Bleaching Powder.**)

One ton of 20 cwt. in casks stows in about 80 feet.

CHOCOLATE.—The seeds or nuts of the *Cacao* tree. Manufactured and packed in casks, tins, etc., which are stowed in cases or casks for shipment.

The Admiralty rate in Great Britain is 16 half-hogsheads, or 26 small casks, to a ton. The half-hogshead is about 108 lbs., and the small cask about 55 lbs.

It may be stowed amongst other cargo, but must be kept dry and free from strong-smelling articles.

In casks, one ton of 20 cwt. stows in about 65 cubic feet.

CHOW-CHOW.—Cases of Chinese preserve contain usually 6 to 24 jars. West Indian cases weigh 77 lbs. and measure 1 ft. 8 ins. each. They generally contain two dozen jars. Chow-Chow should always be stowed mark up, or the syrup may run or leak out and damage other articles.

20 cwt. or one ton stow in about 60 cubic feet.

CHURRAH.—A peculiar resin, extracted from the hemp plant; shipped only in small quantities. (*See* **Hemp.**)

CHUSSUM, or CHASSIAM.—Wild chussum packed in bales. 20 cwt. stow in about 90 feet, badly packed average 100 feet.

CIDER.—A fermented liquor made from the juice of apples. Cider intended for shipment abroad should be in bottles, and at least one year old. Shipped in pipes or hogsheads it should be stowed amongst articles not liable to damage should the cider burst the cask, which it will sometimes do in hot weather.

20 cwt., in casks, should stow in about 65 feet.

CIGARS.—Cases of manufactured tobacco, such as cigars, require to be carefully stowed in a dry part of the ship. On long voyages they should not be placed near such articles as tea, sugar, etc.

One ton in cases, 20 cwt., stows in about 180 feet.

CINCHONA, or PERUVIAN BARK.—First brought to Europe in 1639 by the Countess del Cinchon, wife of the Viceroy of Peru. It is sometimes called Jesuit's Bark, China Bark, Quinine, Quinquina, etc. When gathered from the tree the bark is rolled, dried, and packed in bales, which measure about 7 ft. 4 ins. each. As cargo it has no objectionable quality, and can be stowed where desired; it should, however, be kept away from damp or highly scented articles, as its quality may be injured, especially on long passages.

20 cwt., in bales, should stow in 130 to 150 feet.

CINNABAR.—An ore, the chief source of the quicksilver or mercury of commerce. The well-known colour vermilion is extracted from this ore.

In bags, 20 cwt. stow in about 20 feet, but it varies much according to quality.

CINNAMON and CANELLA.—Obtained by stripping the bark off the branches of the cinnamon tree. The smaller kinds are introduced within the rolls of the larger and then dried in the sun, after which it is packed in bundles of 80 to 90 lbs. It should be kept away from tea, sugar, or other edible articles. Being choice and valuable freight it should be well stowed. (*See* **Canella Alba.**)

In bales or bundles 20 cwt. should stow in 140 feet.

In machine-pressed bales 20 cwt. should stow in 100 feet.

CITRONS.—Candied or preserved, in cases containing 10 small boxes (average size 3 ft. 6 ins. by 1 ft. 9 ins. by 1 ft. 8 ins.), measured 10 ft. 3 ins., weight averaged 300 to 310 lbs. each.

20 cwt. should stow in about 70 feet. Stow as choice freight.

CLAY.—Seventeen cubic feet equal one ton. (*See* **Ballast.**)

CLOCKS.—Packages containing fragile articles such as clocks, watches, etc., should be very carefully handled and stowed as choice, valuable, and dry cargo.

American cases measure from 1 ft. 1 in. to 4 ft. 2 ins. each.

CLOTH GOODS, or articles of a manufactured nature, such as jackets, trousers, great-coats, flannel, serge, stockings, blankets, shirts, palliasses, bolsters, sheets, towels, etc., should be kept dry and away from damp or oily articles; generally packed in tin-lined cases. The heavier articles stow 20 cwt. in 85 to 90 feet. (Uncertain.)

(*See* **Spontaneous Combustion.**)

CLOTHES PINS.—Shipped in cases, 20 cwt. stow in 280 feet to 290 feet.

CLOVES.—The flower buds of a tree growing in the East; they readily imbibe moisture if stowed near any liquid. In the Dutch Settlements they are made up, the best in chests, inferior in bags. In Colombo they are packed in small bags of 50 lbs. each, and are exported thence all the year round. In Amboyna the harvest takes place in November and December. In Zanzibar they are packed and shipped in irregularly-shaped mat bags, weighing about 120 lbs., and should be stowed in the 'tween decks.

One bale of Cloves, 143 lbs., measured 7 ft. 1 in.

One bale weighed 152 lbs., measured 8 ft. 2 ins.

20 cwt. of Cloves in bales stow in 120 ft.

Bales of Indian Cloves 143 to 152 lbs. measure 7 ft. 1 in. to 8 ft. 2 ins. each. (*See* **Spices.**)

Clove stems in bags, 20 cwt. stow in 130 feet.

CLOVER SEED.—When stowed in a damp place will heat and become valueless.

Bags 150 to 160 lbs. each measure 3 ft. 1 in. to 3 ft. 8 ins.

20 cwt. of Clover Seed in bags should stow in 46 feet.

(*See* **Grass Seed.**)

THE COAL PRODUCTION OF THE WORLD.

COAL.—The production of coal in 1910 in the principal countries of the world was as follows :—

U.S. America	492,544,388 tons
United Kingdom	264,433,025 ,,
British India	12,047,413 ,,
Labuan	86,689 ,,
Canada	11,425,457 ,,
Australia	9,758,994 ,,
New Zealand	2,197,362 ,,
South Africa	6,596,067 ,,
Germany	152,881,509 ,,
Austria	137,739,851 ,,
France	38,570,473 ,,
Russia	26,736,000 ,,
Belgium	23,517,000 ,,
Japan	15,535,285 ,,

In 1910, 64,520,320 tons of coal were exported from Great Britain, Bristol Channel accounting for 26,457,855 tons, Tyne and N.E. ports 19,044,331, and Scotch ports 9,226,599 tons.

The important question of ventilating coal cargoes has given rise at different times to much anxious inquiry. A step in the right direction seems to have been taken in 1875, when the subject was brought before the Royal Commission in London. After much consideration that body decided to recommend the Board of Trade to stop through-and-through ventilation and to continue surface ventilation only. It was pointed out that air, to do any good, would have to sweep continuously and freely through every part of the cargo, a condition not obtainable on board ship.

Steam coal is said to absorb about twice its own volume of oxygen in ten days. The admission of small quantities through an air shaft has been found sufficient to aid spontaneous ignition, but not to ventilate the cargo.

The Commission recommended that the temperature in different parts of the hold should be tested daily, and a note of the same made in the ship's book.

A system of surface ventilation should be carried out which would be effective in all weathers, and afford continuous egress to the open air (independently of the hatchways) of gas, which is especially dangerous during the first part of the voyage.

Before receiving a cargo of coal the shifting boards, limbers, sluices, strums, pump-wells, sounding pipes, etc., should be carefully inspected. In steamers especially the sluices should be well oiled, opened and shut, and the limbers cleaned out.

The cement directly under the sounding-rod pipe should be examined, and, if damaged, repaired ; instances have occurred where from constant use the sounding-rod has worked its way through the bottom of the vessel and caused a leak. The side scuttles and ports if open should be whiteleaded and shut ; all ventilators open and in good working order. Blocking up ventilators to prevent the dust coming on deck should never be allowed; it may lead to a serious disaster sooner or later. While loading, the vessel should be kept as near an even keel as possible, and the draught noted from time to time. Three per cent. excess on the B. L. weight should be obtained, otherwise the cargo will turn out short, especially if it be loaded during wet weather. When loading under the tips the officer should get the weight of each wagon load as it comes on board. If loading from barges alongside, the name of the boat and the total weight, as per boat, note and tally.

Bunker coal is liable to spontaneous combustion, probably in a greater degree since the introduction of triple expansion engines and forced draught. It is interesting to note the information contained in a paper Professor Lewis once read on this subject before the Institute of Naval Architects. He showed from experiments previously made on the H.M.S. "CROCODILE," that while the temperature of the stokehole was moderate, that of the bunkers did not differ greatly from it; but when the stokehole became heated to 100° Fahr. action commenced in the bunkers, and this rapidly raised their temperature higher than that of the stokehole. Before stowing different kinds of coal in the bunkers they should be measured by those in charge, and the total capacity carefully noted for future guidance. When supplementing fuel at outports a tally should be kept by an engineer or officer. It is decidedly unsafe to leave such important work entirely to clerks, or other, irresponsible persons, probably sent by the agents supplying the coal. Steamers have often found themselves short in consequence of such neglect. In Newcastle, U.K., the master of every foreign-going steamship must, under a penalty of £5, within six days of clearing, declare at the Custom House to a certificate showing what quantity of bunker coal he has on board for ship's use.

Coal dust will damage most descriptions of cargo, and the ship may be held liable. It is advisable to wash out and dry all holds after discharging coal, before taking in other goods.

The following reported cases afford some illustration of the dangers to be guarded against in carrying coal.

"On September 19th the brigantine 'BONNIE DUNKELD' left Swansea with a cargo of 313 tons of coal from the 'Seven Sisters' Colliery near Neath. This coal, though highly anthracitic, is stated by the Inspector of Mines for the South Wales district to give off considerable quantities of gas for some time after it has been worked. The loading occupied two days, the coal being shot down the main and after hatches, and trimmed so as to slope down from aft forwards, with a space between the cargo and the deck. As soon as the cargo had been taken in, the master closed the fore and main hatches; the next day the after hatches were closed and the fore hatch left open. This, however, was not done for the purpose of ventilation, but to enable the crew to get at the store-room, which was under the deck, just forward of the fore hatch. From the time the vesssl left Swansea until the explosion occurred (about 36 hours) all the hatches were tightly battened down, and the accumulated gas in the hold had no means whatever of escape. A sail being required from the store-room, the master ordered the fore hatch to be taken off, and one of the men went down through the hatch into the sail-room below, where he struck a match and caused the explosion. The master of the 'BONNIE DUNKELD,' who was uncertificated, stated that he thought it unnecessary to ventilate the cargo, as he was not aware that coal of the description on board his ship gave off gas. He also stated that he had never heard of ventilating coal cargoes in vessels of under 400 tons.

"The owners of the colliery from which the coal was obtained did not appear to have given any warning as to the necessity for keeping off the hatches or providing other means of ventilation.

"The Court of Inquiry, in giving judgment, attributed the explosion to the master closing his hatches, and not using any means of cargo ventilation; and the Wreck Commissioner stated that if another case came before him in which it was shown that a certificated master had left port with his hatches battened down, without providing any means of ventilation, and that an explosion occurred, a severe punishment would be inflicted.

"The master further stated that he could not detect the presence of gas by the smell, but the Wreck Commissioner pointed out that an analysis of this kind of coal had been made, which showed that the coal contained only a small quantity of sulphur, and that the gas would consequently be comparatively free from smell."

"The 'SLIEVE MORE,' an iron ship, 1,668 tons nett, sailed from the Tyne on the 30th March, 1885, bound for Bombay, with 2,543 tons of 'West Hartley Main' coal. The coal was shipped in fair condition, and was kept free from water, the ship being perfectly dry. There was an efficient system of surface ventilation; and a daily record of the temperature of the cargo was taken from a thermometer which was left lying on the coal. The vessel was fitted with iron masts open at the ends, and perforated more or less. The masts were stepped on to the keelson, from which they acted as perpendicular ventilators, a half-moon space being left on each side of the keelson. The mastheads were fitted with covers kept in their places by long legs which went inside the masts.

"From the 8th to the 13th of June the vessel encountered very bad weather in the Indian Ocean, during which the hatches were battened down. On the 14th vapour was seen issuing from the ventilator abaft the mainmast, but the thermometer did not show any change of temperature until the night of the 15th, when it rose 20° in the after hatchway, after four or five feet of the coal had been taken out. Everything was battened down, but during the morning of the 16th two explosions took place, and fire was seen burning strongly in the lower hold in the vicinity of the mizen-mast, which at 4.45 a.m. had sunk three feet. At 6.30 a.m. flames issued from the companion and cabin skylight, and everybody then left the ship.

"The Court found that the spontaneous combustion from which the fire originated was probably caused by the hollow iron mast acting as a ventilator; they attached blame to no one.

"In the opinion of the Assessor the fire originated at the heel of the mainmast, and burned slowly upwards."

"The 'REPUBLIC' was a steel vessel, barque rigged, of 2,347 registered tonnage, built at Sunderland in 1891, and belonging to Liverpool. It appears from the evidence that she sailed from Newcastle, Australia, on or about the 22nd January, 1896, bound for San Francisco, with a cargo consisting of 3,770 tons of Wallsend coal, mined from the Co-operative Colliery, Newcastle, New South Wales, and a crew of 30 hands all told. After leaving Newcastle fair weather, but with unfavourable winds, was experienced, and the vessel in consequence made poor progress. The ventilators were kept open continually, and all the hatches were removed during the daytime, the temperature of the hold being taken each day with great regularity by the first mate. No indication of any heating of the cargo was discovered until the 10th of April, when steam was found to be coming from No. 2 hatch. This subsided during the day, but increased in volume on the 11th. The master then ordered all the hatches to be removed, and made an examination of the cargo, testing it with iron rods in several places. He jettisoned from 20 to 30 tons of coal from No. 2 hatch. A very large quantity

of water was then pumped into the hold on this and the following days. The heat in the tubes was found to be normal, and this continued to be the case until April 16th. Some of the crew were set to work to dig down, in order to get at the seat of the fire, but could not continue the work on account of the smoke and gas, which overpowered several of them. On April 16th a heavy explosion took place, blowing off several of the hatches. On the 17th a sail was sighted, which proved to be the British ship 'HOLLINWOOD,' and in response to signals made by Captain Hughes, the master, Captain Kidd came on board and promised to stand by the 'REPUBLIC' and take off the crew in case she had to be abandoned. Finding it impossible to subdue the fire, which continued to spread despite all efforts made to control it, the vessel was finally abandoned on the 19th of April, and all hands were transferred to the 'HOLLINWOOD,' the two vessels being at the time in latitude 34° 44' North and longitude 127° 15' W. When the crew left the 'REPUBLIC' the foremast was settling down, and the deck had begun to sink; flames were bursting out of the hatches, and everyone on board, as well as the master of the 'HOLLINWOOD,' considered it highly dangerous to remain longer. All hands were safely landed at the port of San Francisco by the ship 'HOLLINWOOD' on the 24th of April.

"The Court, having considered the evidence, finds the 'REPUBLIC' was well found and seaworthy at the time of her departure from Newcastle, and was fully provided with all the apparatus necessary. That the cargo was well and properly stowed, that the ventilation was good and sufficient, and that the vessel was not overladen. That the master, Seth Hughes, navigated the vessel in a proper and seamanlike manner, that every care was observed on board in attending to the ventilation and in noting the temperature., That the officers and crew behaved in an exemplary manner, and that perfect discipline was maintained on board, and everything was done that could be done to get the fire under. In the opinion of the court the master deserves great praise for the manner in which he performed his duty. The master and officers are therefore exonerated from all blame. The Court thinks that if the 'REPUBLIC' had been provided with facilities for discharging steam into the hold, there would have been a possibility of saving the ship and cargo."

"The 'GREECE,' an iron screw steamer, of 3,242 tons nett register, London for New York, with a general cargo, was lying at the Eagle Dock, Hoboken, New Jersey. Her bunker coal (originally consisting of 1,252 tons) was obtained from Cyfartha Collieries, and being semi-anthracite coal was of a very gaseous nature, and required

free surface ventilation. Of the bunker coal 413 tons were stowed midships in the lower hold, beneath the orlop deck, which deck was also partly filled with cargo. Above this another patch of coal was stowed upon the steerage or 'tween decks. The ventilation of the lower hold had been entirely overlooked or neglected when the vessel was loaded, although this hold is stated to have been properly ventilated on previous voyages. When the 'GREECE' arrived at Hoboken, and while the vessel was being hauled alongside the wharf, four stevedore's men rushed on board, and after removing the hatches of the orlop deck, went into the main hold with a lamp, which was subsequently found on the upper deck smashed to pieces, thus clearly indicating the cause of the disaster.

"The Court of Inquiry held the casualty was due to the stevedore's men taking a light into the hold, without the knowledge of the officers of the 'GREECE,' and that the gas had accumulated owing to the absence of ventilation in the No. 3 lower hold. From the evidence adduced at the inquiry it appears that the 'GREECE' had been loaded and coaled under the supervision of the National Steamship Company, and that the captain had practically no knowledge of the nature of the cargo, or ventilation of the holds, when he took command of the ship. Three of the stevedore's men were killed."

Captain H. Jameson of the SS. "INDIA," registered tonnage 1,567; gross 2,471, writing on this subject, says:—"Loading coal, one officer should always be about the holds; my experience goes to show, 'Never put your trust in coal-trimmers, or you will be sorrowful before you reach your destination.'

"On one occasion I had my ship nearly on her beam ends through the coal shifting. Of course it requires heavy weather to do this.

"The most coal I have ever carried on this ship is 2,900 tons (bunkers included). Mean draft of water leaving Cardiff was 23 feet 5 inches.

"Coal requires plenty of ventilation, and no person should be allowed to enter the store-rooms with a naked light till the hatches have been opened, and every care taken to ascertain there is no foul gas below."

Coal taken on board during wet weather will turn out on delivery 2½ to 3 per cent. short of original weight.

Welsh Steam Coal, 20 cwt. stow in about 40 cubic feet.

Newcastle, Shields, and Lancashire Coal, 20 cwt. stow in about 45 feet.

20 cwt. of Japan coal average 43 to 45 feet.

Australian—Newcastle, 20 cwt. in 43 to 47 feet.

Good American coal, 20 cwt. in about 40 feet.
Other coal varies from 20 cwt. in 43 to 47 feet.

COCA.—The dried leaves of the *Erythroxylon Coca.* Packed generally in bags. From these leaves the new alkaloid *Cocaine* is obtained. The leaves are chewed by the natives of South America, and it enables them to undergo great exertion with little or no fatigue.

Shipped only in small quantities, 20 cwt. stow in 250 feet.

COCCULUS INDICUS.—Indian Berry or Levant Nut, is kidney-shaped, with a woody shell and yellow kernel. In bags, 20 cwt. stow in 50 feet. (Uncertain.)

COCHINEAL.—An insect of small size and of a deep red or mulberry colour. It has generally a sickly odour. After being scraped from the Cactus plants they are killed by boiling water and dried in the sun. About 70,000 of them average one pound of cochineal. This is considered a valuable article of merchandise, and liable to damage by improper stowage. It should be kept in a dry, cool place, and away from any moist or raw material.

Serons of cochineal from the West Coast of America weigh about 120 to 170 lbs. each.

Tin-lined cases weigh about 250 lbs., and measure 10 feet each.

"Stevens on Stowage" gives a case where 51 serons of cochineal, packed in the usual West Coast hides, each seron weighing 120 lbs. gross, were shipped at Callao in 1861, *via* the Isthmus of Panama Railway, and afterwards shipped on board the W. I. SS. "PLANTAGENET" for Liverpool. A claim of about £280 was made on the owners of the vessel. Three experienced produce brokers declared the parcel damaged owing to improper stowage, the cochineal having been placed on vegetable nuts and copper. The owners of this steamer avoided liability through some extra clause on the B.L., since cancelled.

The P. and O. S. N. Co. had a claim made against them in Bombay for cochineal damaged by heat. The cases in this instance were tin-lined, and the contents on opening were found in a state of liquefaction, said to be caused by stowage near the engines or stokehold of the vessel.

COCOA.—About the year 1520 the seeds of the *Cacao* tree were first introduced into Europe as a medicinal agent. In its native state the tree often grows upwards of 20 feet high. At certain seasons the seeds are extracted from the fruit, dried in the open air by fire, and packed. When stowed on board ship they should be

kept away from moist, heating, or scented articles, and well ventilated.

New York boxes measure about 5 feet 6 inches each.

East India and Ceylon bags weigh about 126 lbs. each.

20 cwt. stow in about 80 feet.

COCOA-NUTS.—Shipped in bags, nets, or in bulk. When dry and without the husk they may be stowed below on short passages without fear of damage, provided the nuts are carefully handled and not broken in slinging. (*See* **Nuts.**)

20 cwt. of Nuts in bulk stow in about 140 feet.

COCOONS.—The shell or covering in which certain insects protect themselves during their chrysalis condition. The cocoons of the silkworm, *Bombyx More*, is the source of ordinary silk. Several insects, notably the *Tussur* moth, produce a strong silky fibre, from which the *Tusseh* Silk is made. Boxes containing these articles should be treated as choice cargo, and be carefully looked after.

20 cwt. stow in about 210 feet. (*See* **Silk.**)

COFFEE.—Shipped in bags, casks, or tierces, sometimes in cases. When receiving this article care should be taken to see that the packages are full and up to weight, if they are to be receipted for as such. It will readily damage, especially on long voyages, if stowed near damp or objectionable articles, such as tar, turpentine, guano, bones, etc.

Ceylon Coffee is generally of two kinds—Native and Plantation. Mocha Coffee is considered the best in the world.

Ceylon casks weigh 9 to 16 cwt., and measure 48 ins. by 28 ins. by 28 ins. each.

West Indian tierce 5 to 7 cwt.; bags 1½ cwt. measure 5 ft. 1 in. each.

20 cwt. of Coffee in bags stow in 60 feet.

20 cwt. of Coffee in tierces stow in 70 feet.

Coffee in parchment, in bags, 20 cwt. in 80 feet.

COFFINS.—Generally packed one inside the other, and called 'nests.' Two nests in one case. Cases of American Coffins shipped for use in Great Britain weigh from 200 to 290 lbs., and measure from 22 ft. 6 ins. to 27 ft. 3 ins. each.

20 cwt. should stow in about 257 feet.

Coffins are sometimes shipped in the form of rough planed boards, of suitable sizes for the purpose.

COIR, AND COCOA-NUT FIBRE.—Generally packed in bales, bundles, loose ballots, dholls, etc., the yarn and fibre in

screwed bales. Greatly used in the East for making ropes and mats. It is questionable whether in the event of damage to goods, surveyors would pass dholls of coir yarn as dunnage on a caulked deck or lower hold. It generally is shipped as broken stowage, and sometimes used as dunnage.

Bales of Coir Fibre weigh 11 to 14 lbs. each.

20 cwt., or one ton, of Coir Yarn in bales stow in about 190 feet.

20 cwt., or one ton, of Coir Fibre stow in about 200 cubic feet.

One ton of other kinds stows in 200 to 220 cubic feet.

Bundles of Coir Fibre from India and Ceylon, for London and New York, about 1 foot each, weigh 11 lbs.; about 1 ft. 5 ins. each, weigh 14 lbs. each.

COKE, or "Coked" Coal, contains about 10 to 12 per cent. of ash; exclusive of this it is nearly pure carbon. It can only be made from that class of coal known as "coking coal," and is about half to two-thirds as heavy as coal. It is said to absorb about 20 per cent. of moisture.

Cargoes of this nature require plenty of surface ventilation. Coking in a close oven will give a gain of 40 per cent. over coking in heaps, the gain in bulk being 22 per cent. Bituminous coal will yield 60 to 80 per cent. of coke. There is very little dust from good coke.

COLOCYNTH.—The dried pulp of the bitter cucumber. When shipped in cases it has a spongy appearance, and a dry, sour smell. Shipped only in small quantities.

CONDENSED MILK.—In tins packed in cases. Several shipments of this article from Antwerp for Hong Kong were found much damaged by rust on delivery; surveyors in their report considered the tins to have been packed damp, and labelled with injurious materials, which caused the damage during the passage.

Cases weigh 56 to 60 lbs., measure 8 ins. by 13 ins. by 20 ins. and equal 1 ft. 2 ins. each.

20 cwt. should stow in 45 feet.

COPPER.—Vessels in the Copper Ore trade are generally fitted with platforms and trunkways, not only to equalise the weight in the bottom, but to ease the vessel in a heavy sea. (*See* **Ores.**)

Copper dross, often shipped as ballast, has a tendency to destroy ironwork if exposed to its action. Amongst a general cargo, when receiving manufactured copper, such as sheets, bars, ingots, etc., they should be carefully tallied by a reliable person and stowed in a safe part of the hold. Heavy claims are sometimes paid for

shortages of this metal, which in most cases might have been avoided by a careful tally.

Ingots and casks of manufactured Copper vary in size and weight from 20 to 60 lbs. each.

Manufactured Copper, 20 cwt. stow in 10 feet.

20 cwt. of copper ore (uncertain) stow in about 10 to 20 feet.

COPPER MATTE.—One ton of 20 cwt. stows in 18 to 20 feet.

COPPERAS, AND COPPER SULPHATE.—Shipped in casks and hogsheads. The steam or moisture arising from water getting at these articles will damage other goods. Consequently they should not be stowed over dry articles, especially of an edible nature. The hoops of casks used in packing invariably rot, or get adrift, even on short passages.

Barrels of 3 cwt. each measure 32 ins. by 19½ ins. by 19½ ins. each.

Casks of Copper Sulphate, 20 cwt. stow in 20 feet.

Casks of Copperas, 20 cwt. should stow in 52 feet.

COPRA.—The inside or pulp of the cocoa-nut, removed from the husk and dried in the sun. There is a stale oily smell about it that would damage food products if stowed near. In bags it often mildews and smells sour. Cases of Desiccated Copra shipped in Ceylon have been found to give out an oily secretion when heated; otherwise, when tin-lined, it should be free from smell or objectionable qualities.

Cases of Desiccated Copra shipped from Colombo to New York, tin-lined, measure 24 ins. by 19 ins. by 19 ins. and weigh 159 to 184 lbs. each.

One ton of 20 cwt. Desiccated Copra in cases stows in about 65 cubic feet.

One ton of 20 cwt. of Copra in cases stows in about 80 to 90 feet.

One ton of Copra in bales stows in about 85 feet.

CONFECTIONERY, or CONSERVES.—Packed in cases should be treated as choice cargo, and stowed in a part of the between decks apart from rough or objectionable articles.

20 cwt. of cases stow in about 62 feet.

COQUE DE PERLE.—Bags, 20 cwt. stow in 50 feet,

COQUILHOS.—The seeds of the palm are called Coquilla Nuts. The wood itself has a beautiful mottled appearance when polished. It is sometimes shipped in small quantities from South America for broken stowage.

One ton of 20 cwt. stows in about 56 feet.

CORAL.—The Red and Pink is generally found in the Mediter-

ranean, Black in the Red Sea, and White Coral more or less over all parts of the tropical world.

Manufactured articles should be treated as valuable, and carefully stowed in a safe place. Choice rough pieces can be stowed where they will not get crushed or damaged ; not, however, among dry goods, such as sago, tea, flour, etc.

Coral is generally packed in boxes, bags, or barrels.

Boxes, 20 cwt., stow in about 60 to 80 feet.

Rough Coral, in bags, shipped in Ceylon, 20 cwt. stow in 90 feet.

CORIANDER.—A plant of which the aromatic seed is used for flavouring and other purposes.

20 cwt. should stow in 85 feet.

CORIANDER SEED and CUMMIN SEED.—In bags of 106 lbs. each. 20 cwt. stow in 120 feet to 130 feet.

CORK.—Shipped principally from Spanish and Portuguese ports. Being a light article, and never very tightly packed, it takes up a great deal of space. It can be stowed among any dry cargo.

Pressed bales, containing 20 cwt. Cork, stow in about 200 cubic feet when well packed.

Bales of Cork shipped from France average 132 lbs. ; 20 cwt. stow in 440 feet.

Bales of Cork Wood average 154 lbs. each ; 20 cwt. stow in 270 feet.

Bales of Cork Shavings average 275 lbs. each ; 20 cwt. stow in 290 feet.

CORN, INDIAN.—Boxes of prepared Maize should be treated as choice or light freight, and carefully stowed.

Average size 48 lbs., and measure 1 ft. 2 ins. each ; 20 cwt. in boxes stow in about 58 feet.

CORNED AND PICKLED BEEF.—In the market a distinction is made between corned, and salted or pickled, beef. Corned beef intended for immediate use is very slightly salted. Merely rubbing the surface of the meat with fine salt, or a mixture of salt and sugar, is sufficient to give the required degree of saltness. If consumers like it extra salt, some strong brine is forced into it with a force-pump.

Curing Meat, or Pork.—To one gallon of water add 1½ lb. of Salt, ½ lb. Sugar, ½ oz. Saltpetre, ½ oz. Potash. In this ratio the pickle can be increased to any quantity desired. Let these be boiled together uutil all the dirt from the sugar rises to the top and is skimmed off. Then throw it into a tub to cool, and when cold pour it over your Beef or Pork, to remain the usual time, say four or five weeks. The meat must be well covered with pickle, and should not be put down for at least two days after killing, during which time it should be slightly sprinkled with powdered Saltpetre, which removes all the surface blood, etc., leaving the meat fresh and clean. Some omit boiling the pickle, and find it to answer well, though the operation of boiling purifies the pickle by throwing off the dirt always to be found in salt and sugar. If this recipe is properly tried it will never be abandoned. There is none that surpasses it, if so good.

(*See* **Beef and Pork.**)

COTTON.—Cotton was known and used in the East 3,000 years ago. Cultivated in tropical and semi-tropical climates, it now takes rank in extent and value above other crops, excepting wheat and rice. There is daily an increasing demand for its manufacture. Powerful hydraulic presses are employed for reducing the size of the bales, which are then bound round with iron bands, or thick cords, weighed, measured, marked, and shipped to and from various parts of the world.

From the King's Speech at the opening of Parliament, Feb. 2nd, 1904, we extract the following:—

"The insufficiency of the supply of the raw material upon which the great cotton industry of this country depends has inspired me with deep concern I trust that the efforts which are being made in various parts of my Empire to increase the area under cultivation may be attended with a large measure of success."

The Liverpool Cotton-brokers' Association arrange their returns under various heads, viz.:

American.—This includes the whole produce of the United States, and is the most extensive and finest in the world.

Brazilian.

Egyptian.

Turkish and Grecian.

West Indian.

East Indian.

Where it is possible, the bales should be examined before being received on board, and should they show signs of having been wet or damaged they ought to be refused, or else a remark made on the B.L. to that effect.

When stowing cotton over grain, care should be taken to block right off to the deck, otherwise the grain may shift in heavy weather. Oil, grease, turpentine, tar, etc., should not be stowed near cotton.

All smoking or naked lights should be strictly prohibited while loading or discharging cotton. At sea, on board steamers especially,

ventilators or openings from the deck should be carefully guarded to prevent sparks of fire getting down to the cargo.

To determine approximately how many bales of cotton a vessel should carry, take for sailing vessels 3½ to 4 bales per ton, for steamers 4½ per ton, or 1,900 to 2,100 lbs. per nett ton register.

The average weight and measurement of bales of cotton vary considerably.

New Orleans, per bale, about 470 lbs. or 33 feet each.

Sea Island	,,	333 ,,	35 ,,	
Upland	,,	391 ,,	22 ,,	
Mobile	,,	500 ,,	23 ,,	
Calcutta	,,	410 ,,	11 ,,	hard pressed.
Madras	,,	300 ,,	12 ,,	,,
Egyptian	,,	775 ,,	20 ,,	,,
West Indian	,,	212 ,,	25 ,,	
Brazilian	,,	182 ,,	17 ,,	
Do.	,,	462 ,,	10 ,,	hard pressed.

Bales of cotton shipped at New York, pressed, 480 lbs., measure 24 feet; unpressed, 480 lbs., measure 37 to 43 feet each.

Bales of cotton waste 500 lbs. measure, pressed, 37 feet.

American. One ton of 2,240 lbs. pressed cotton stows in about 130 feet.

American. One ton 2,240 lbs. unpressed cotton stows in about 200 feet.

East Indian bales, 20 cwt., stow in about 57 feet; others 54 feet.

Good average bales, 410 lbs. each, stow 20 cwt. in about 52 feet.

Ordinary pressed, 275 lbs. each, 20 cwt. in 67 feet.

Captain Parry, of the American ship "CAMBRIA," stated at a trial in Liverpool that if the bales in question had been exposed to rain before shipment they would afterwards dry very quickly on the outside, and it would be difficult without opening them to ascertain if the centre was dry or not. He had carried bales of cotton which were found rotten and decayed on arriving in port, although the bales were apparently shipped in good order and condition. In this case the shipowner had to pay £193 11s. 6d. for damage that appears to have been done before the cargo was received on board.

Mr. William H. Logan of the SS. "FLAVIAN" states:—"In reply to your enquiry *re* size and weight of Egyptian Cotton Bales, I have the following information direct from Mr. F. Elsworth of Alexandria.

"Bales, dimensions, 51 ins. by 31 ins. by 22 ins., equal 20 cubic feet nearly.

"Bales, weight from 7½ to 8 cantars, average say 775 lbs., a cantar being 100 lbs.

"These bales are the regular size and weight for all Egyptian Cotton Bales for shipping. Each bale is held by 11 hoops, each having a gross length of 8 feet with 2-inch lap, 1⅛ ins. wide, 18 w.g., of which 1,400 hoops go to the ton."

(*See* **Waste.**)

COTTON SEED.—A ship may take about the same quantity of new Alexandria cotton seed as of ordinary mats, not Archangel, which are heavy.

Cotton seed in bulk, 20 cwt. stow in 64 feet.

20 cwt. in gas should stow in 80 feet.

COWRIES.—Shell-fish have from time immemorial contributed enormously to the wealth of the world. Not merely have they given up to man pearls of price, as well as the materials of their own dwellings for ornamental purposes, but they have supplied him for centuries with all the money he needed to spend. Before gold, silver, and copper came into use as a medium of exchange, shell money was used for the same purpose all over the world.

To this day it is employed as cash to some extent in Southern Asia, the Islands of the Indian and South Pacific Oceans, in many parts of Africa, and India.

In these regions the "cowry shell" is the one chiefly employed, for the reason that it is of convenient size and the natural supply of it is limited, so that no one cowry shell may be considered to represent a definite amount of labour in the process of finding, and there is no material chance of a sudden inflation of the currency by the discovery of a great deposit of cowries. One hundred cowries are worth about a penny, and strings of them are receivable where they are current for merchandise, labour, or anything purchaseable.

In the Soudan there is hardly any other currency in use. The late firm of Goddefroy & Co., of Hamburg, were accustomed to send vessels to Zanzibar for cargoes of cowries, with which cargoes of palm oil and other produce were purchased on the West Coast of Africa. Cowries were formerly used in the purchase of slaves. The main source of supply of this species of shell is the Seychelles and other islands in the Eastern Seas.

Cases average about 55 lbs., bags about 80 lbs. each, according to quality.

When clean and free from dirt they may be stowed where desired. 20 cwt. stow in about 40 feet.

CRANBERRIES.—Packed generally in barrels 2 ft. 4 ins. by 1 ft. 8 ins. by 1 ft. 8 ins. and measure 6 ft. 6 ins., weight 130 to 135 lbs. each.

CREAM OF TARTAR.—In hogsheads of 1,300 lbs. each. 20 cwt. stow in 60 feet.

CREOSOTE.—A colourless transparent fluid obtained from tar by distillation. In its crude form it is much used for impregnating timber, and thereby protecting it from the ravages of white ants or other insects. Creosoted wooden sleepers are sometimes shipped in large quantities. When discharging such cargoes the labourers find it impossible to remain in the holds for any length of time without coming on deck to breathe : the fumes are so strong and pungent that their breath is taken away. Much care should be taken after having creosote in any shape on board, that the smell and effect are entirely done away with, or very serious claims will arise in the event of any cargo being afterwards damaged by it. Now frequently carried in bulk by tank steamers. Specific gravity from 1·050 to 1·080.

20 cwt. in casks stow in about 60 feet.

CUBE GAMBIER.—Dry, clean, inodorous cargo. 20 cwt. stow in about 120 feet. (*See* **Gambier**.)

CUBEBS.—A dried vegetable having a pungent taste and slight sickly odour. 20 cwt. stow in about 84 feet.

CUBIC SPACE.—When the solid contents of any package is required the length, breadth, and depth must be taken, these should be multiplied together ; for instance, a bale measuring 4 ft. 7 ins. by 3 ft. by 1 ft. 5 ins. With the help of vulgar fractions the method is as follows :—

Cubic contents :—L. B. D.

$$4\tfrac{7}{12} \text{ by } 3 \text{ by } 1\tfrac{5}{12} \text{ feet}$$
$$\tfrac{55}{12} \text{ by } \tfrac{36}{12} \text{ by } \tfrac{17}{12} \text{ ,,}$$
$$= 19\tfrac{23}{48} \text{ cub. ft.}$$

equal 19½ cub. ft. nearly, or 19 cub. ft. and 828 cub. ins. (there being 1,728 cubic inches in one cubic foot).

Without using vulgar fractions, if all the dimensions are reduced to inches, we have :—

Cubic contents :—L. B. D.

55 by 36 by 17 inches

— 33,660 cub. ins. (then dividing by 1,728), equal 19 cub. ft. and 828 cub. ins., or 19½ cub. ft. nearly.

A much quicker method, however, is by using "*The Merchant's and Ship Master's Ready Calculator*," a set of tables specially made out for this purpose, and published by Messrs. Imray, Laurie, Norie & Wilson, Minories, London.

CUMMIN.—Cummin is a substitute for pepper, and is shipped from various Mediterranean ports. 20 cwt. stow in about 70 feet.

CURRANTS.—Shipped principally in the Mediterranean. Patras currants find their way into all Continental markets. This kind of cargo requires ventilation, especially on long passages.

20 cwt. in cases stow in 50 feet.

CUTCH.—The solidified extract of a species of *Acacia* bark, found in the Malay Archipelago, Borneo, and Burmah. The process of extraction requires expensive and somewhat complicated plant ; the chief difficulty in the preparation being found in removing the surplus water after boiling the bark. The following method is usually adopted :—

Three to four hundredweights of bark being put into a large tank, a steam jet is applied, which serves to keep the contents at boiling-point. This process of steaming is continued three days, after which it is passed through strainers, and into a vacuum tank to remove all moisture ; after being again treated it is run into boxes of 1 cwt. each, marked and numbered, ready for shipment. The extract contains 45 per cent. of pure tannin. It is very soluble and apt to damage other articles in its vicinity. Where it is possible it should be kept by itself. If shipped in bags, and much pressure lying on it, it will adhere to the vessel, and cause trouble and expense in unloading. It is frequently packed in rattan baskets, in quantities of 1 cwt. each.

20 cwt. stow in about 68 feet. (*See* **Gambier.**)

CUTLERY, also hardware goods, packed in casks (generally cases lined with soldered tin or zinc), should be kept apart from liquids, and articles such as sugar, salt, nitre, etc.

CUTTLE FISH.—Dried, in cases of 200 lbs. each. 20 cwt. stow in about 160 feet.

DAMAGED GOODS.—If a clean receipt or bill of lading has been granted for goods received, should they be in bad order when delivered, the onus will be on the owners and master to prove that the damage did not occur through any fault of the ship or ship's servants, or that the damage is provided for by one of the exception clauses in the B.L. It is at all times, however, a wise precaution

to call in a Surveyor and consult with him before delivering or discharging damaged goods.

DAMMAR, or DAMMARA.—The Oriental name for gum or resin. The Kauri gum is known as Australian dammar. The Amboina pine produces a colourless, transparent gum known as Singapore dammar. From trees in India is obtained the black and white dammar, all more or less used for making up varnish, etc. From Singapore we have Gum Arabic, Gum Benjamin, Gum Copal, Gum Dammar.

Shipped in cases generally. 20 cwt. stow in about 85 feet.

DANGEROUS GOODS.—All acids of a destructible or dangerous nature, powder, nitro-glycerine, gun-cotton, petroleum, blue billy, inodorous felt, apothecaries' ware, oily waste, or cotton drippings, woollen yarn, sulphated salts, etc. Sections 446-450 of the Merchant Shipping Act, 1894, provide regulations and penalties for their carriage by sea.

EXTRACTS FROM MEMORANDUM RELATING TO THE CARRIAGE OF DANGEROUS GOODS. Issued by the Board of Trade, 1907.

Sulphuric Acid, Carbolic Acid, Phosphoric Acid, Picric Acid, Nitre Cake, Chlorate of Potash, Amorphous Phosphorus, Sulphide of Sodium and Sulphide of Potassium, Peroxide of Sodium, Caustic Potash, Bi-sulphide of Carbon, Sulphur Dioxide, Liquid Ammonia, Dinitrobenzol, Naphthaline, Liquefied Carbonic Acid, Matches, Oiled Materials, Inodorous and other Felt, Lampblack, Carbon Papers, Glue Pieces, Carbide of Calcium, Acetyloid.

SULPHURIC ACID.

The question having arisen as to the conditions under which strong Sulphuric Acid contained in electrically-welded steel drums—holding about half a ton each—could, with proper regard to safety, be carried on board ship and stowed under deck, two steel drums of the following dimensions were tested to destruction :—

External Diameter.	Length over all.	Thickness of Body.	Thickness of Ends.	Approximate weight of Drum and Sulphuric Acid.	Remarks.
ft. ins.	ft. ins.				
1 5	2 2½	·07 inch	·08 inch	410 lbs.	Ends unstayed.
2 1½	3 4½	·09 ,,	·087 ,,	1,420 ,,	Ends unstayed; body strengthened near the centre part by two I-shaped rolling rings, 1½ inches deep.

The ends were flat and flanged at the periphery and electrically welded to the body. The results showed that they are strong enough to withstand rough usage when filled with sulphuric acid.

The acid can be carried with safety under deck if the drums are embedded in coal to a depth of not less than three-fourths the diameter of the drum, it being of course understood that the quantity of coal must be sufficient to absorb any leakage from the drums, and for this purpose a depth of one foot of coal for every hundredweight of acid contained in the largest drum in the shipment, but with a minimum depth of six feet, may be deemed sufficient.

In the event of leakage, coal even in a powdered state will not evolve heat by reason of the presence of sulphuric acid, and the marketable condition of only so much of the coal as is wetted by the sulphuric acid is affected.

The possible results that may be anticipated as regards spontaneous combustion in a cargo of coal on the surface of which drums of sulphuric acid have been embedded, are :—

(1.) If the sulphuric acid escapes into the coal spontaneous combustion will not take place within the region of the leakage.

(2.) If the spontaneous combustion takes place first, then the rupture of the drums, and consequent escape of the sulphuric acid, will retard or extinguish the fire by the production of sulphurous acid vapour, in which combustion cannot be sustained. This gas has a pungent odour and a strongly suffocating effect, so that great care should be taken to keep away from it.

Any coal that has been wetted with sulphuric acid should not afterwards be used.

It is the practice at some ports to stow sulphuric acid in a compartment by itself on a layer of chalk, but the leakage of sulphuric acid on to the chalk would produce carbonic acid gas, a heavy odourless gas which it is dangerous to inhale, and which gives no warning of its presence. For these reasons, the ventilation of a space where this practice is followed should be carefully attended to before any person is allowed to enter the compartment, the down cast being carried as low as possible.

It is recommended that wherever sulphuric acid is carried under deck, the precautions indicated above should be observed, but it is of course to be understood that drums of sulphuric acid should not be stowed on coal known to be specially liable to spontaneous combustion.

If sulphuric acid is carried as deck cargo, the drums containing the acid should be so stowed as to be safe and secure, and readily jettisoned in case of danger, and so that neither the stability of the ship nor the free communication of the crew on the deck is dangerously interfered with.

CARBOLIC ACID.

The Court of Inquiry which investigated the circumstances under which in January, 1901, three seamen lost their lives while endeavouring to secure some casks of carbolic acid which had broken adrift, and been stove in, were of opinion that the men's death was due to absorption of carbolic acid through the skin, and found that the barrels containing the acid, being what is known in the trade as second class barrels, were not up to the usual standard, and that, while stowed properly and in the usual manner, they were not sufficiently secured from shifting by being tommed down from the upper deck. The Court considered that special care should be taken in connection with this acid : that the casks in which it is shipped should be thoroughly sound and fitted to withstand the risk of bad weather : that care should be taken as to the manner and place of stowage, so that in the event of bad weather the danger and risk may be minimised, and that all those who are called upon to handle such cargo should be made aware of the special danger incurred by absorption of the acid through the skin.

Phosphoric Acid.

There is no objection to the shipment of Phosphoric Acid under deck if it is contained in strong stoppered bottles packed with wool or sawdust in strong wooden cases, each containing not more than six bottles.

Picric Acid.

The Board of Trade have advised their Surveyors in November, 1910, that they need raise no objection to Picric Acid being carried under deck without a magazine in ships other than emigrant ships, if the following conditions are complied with, viz. :—

(1.) The packages must be of sufficient strength not to allow any of their contents to escape when subjected to rough usage.

(2.) It must be stowed away from boilers and strong mineral acids, paints, etc., and not in contact with lead.

(3.) Each package must be marked as follows :—

" Explosives Class III., Division 2.
" Picric Acid.
" (If not crystals state percentage of water.)
" To be stowed away from boilers, also strong mineral acids, paints, etc., and not in contact with lead."

(4.) Subject to these provisions the total quantity of picric acid to be stowed on board any one ship is limited by the proviso that not more than ten tons may be carried in each separate hold or compartment.

Nitre Cake.

Nitre Cake is a by-product of the manufacture of nitric acid and contains free sulphuric acid and sulphate of soda, with a small percentage of free nitric acid. When dry it is harmless, but it absorbs moisture very readily from the air and when wet will corrode wood or iron. It will also, when in contact with iron, cause hydrogen gas to be given off. Masters should always be informed of these qualities of the substance.

When shipped for abroad on long voyages it is advisable that it should be packed perfectly dry in strong airtight vessels, or that other efficient means should be taken to guard against the risk of corrosion and of evolution of gas. It should not be carried in bulk

When carried coastwise nitre cake may be shipped in bulk, provided it is shipped dry, and kept dry, and that the hold is efficiently ventilated. The hold should be thoroughly cleansed after the discharge of the cargo.

Chlorate of Potash.

Chlorate of Potash, although by itself incombustible, is a far more intense supporter of combustion than saltpetre ; some of the mixtures of combustible matters and chlorate of potash are liable to spontaneous combustion, and all such mixtures are sensitive to percussion, especially when it is combined with friction. Moreover, some chemicals have a very violent action on this substance, and many mixtures of combustible substances and chlorate of potash are set on fire if acted on by strong sulphuric acid.

These properties render the following precautions necessary to ensure the safe carriage of this substance on board ship.

(1.) The chlorate should be packed in iron drums, or if that is not possible, in paper-lined casks of sufficient strength not to allow any of their contents to escape when subjected to rough usage.

(2.) Casks or drums containing the chlorate should not be stowed in the same hold with combustible materials, or should be separated from such substances by a partition.

(3.) They should not be stowed in the neighbourhood of the strong mineral acids, especially sulphuric acid, in such a manner that any escaping acid could reach the cylorate.

(4.) Not more than ten tons of chlorate of potash should be carried in one hold.

Amorphous Phosphorus.

Amorphous, or Red, or Schrotter's Phosphorus, which is wholly distinct in its physical characteristics from ordinary or yellow phosphorus, is not liable to spontaneous combustion and does not take fire in air until it is heated to 260° C. or 500° F.

This, although a low temperature as compared with most other substances, is, nevertheless, considerably above the temperature of the ignition of dynamite or similar explosives as well as that of most varieties of matches. It is a temperature which on board ship would not be reached except through fire.

No objection need be taken to its stowage below deck, provided it is packed in tin.

It may be added that shipments are usually made in 10 lb. tins, ten tins being stowed in a case, and that it is not necessary to preserve this phosphorus under water.

Sulphide or Sodium and Sulphide of Potassium.

The Sulphides of Sodium and Potassium in the dry or anhydrous form are liable to spontaneous combustion and should be packed in strong, air-tight vessels, such as steel drums.

In the hydrated condition the sulphides of sodium and potassium are not liable to spontaneous combustion, and no objection need be raised by an Officer of the Board of Trade to their shipment on this account,

Peroxide of Sodium.

Peroxide of Sodium by itself is not an explosive, but it becomes dangerous when it comes into contact with any combustible substance ; it should therefore be packed in iron or steel drums sufficiently strong to stand rough usage without allowing any of their contents to escape, and not too large for ready handling. The drums should not be stowed in a space containing combustible materials.

Caustic Potash.

Caustic Potash, *i.e.*, the solid hydrate of potash, when packed in iron or steel drums, may be carried with safety below deck, provided the drums are so placed that no leakage from them can come into direct contact with crew or passengers.

Bi-sulphide of Carbon.

Bi-sulphide of Carbon, or Carbon Bi-sulphuret, is " Dangerous Goods " within the meaning of section 446 of the Merchant Shipping Act, 1894, and should therefore be marked as required by that section.

It is a colourless, heavy, mobile, volatile liquid, which evaporates very quickly. It produces a pressure in any closed vessel containing it. It easily passes through the smallest opening, and it is very difficult to keep the drums tight in which it is stored.

It is not liable to spontaneous combustion, but both the liquid and its vapour take fire at very low temperatures, the liquid at rather a lower temperature than the vapour. The vapour has a tendency to travel, and if it finds its way to any surface sufficiently warm to ignite it, the flame will flash back and ignite the liquid. This is known to have occurred when the liquid was at a distance of 20 feet from the warm surface. The mere striking together of two pieces of iron within the inflammable atmosphere may cause ignition.

It has a very powerful and penetrating odour, which in small quantities resembles that of foul vegetable matter.

Bi-sulphide of carbon should be carried in strongly made and perfectly tight drums of not more than ten gallons capacity each. The drums should be satisfactorily tested by hydraulic pressure to at least 40 lbs. per square inch before being used, and a space of at least 10 per cent. should be left in each to allow for expansion of the liquid. Drums of the kind employed by the Government of India for the shipment of ether are recommended for this purpose.

The drums should be packed in strong wooden cases (which should be perforated) with not more than two drums in each case, each drum being in a separate compartment of the case.

It should be carried as deck cargo only, the utmost care being taken to protect it from the rays of the sun, or lights, or sparks; sail cloth (not black tarpaulin) is suggested as a covering. It should be stowed apart from all other goods, whether dangerous or not, and kept at a distance from all steam pipes, funnels, or other heated objects, and from all hatchways or other openings in the deck; also from all living quarters of the vessel; and smoking in its vicinity should be strictly prohibited.

The cases containing the drums should be examined at frequent intervals (at least twice in 24 hours), during daylight, to ascertain if there is any escape; and if any leakage is detected, even by the presence of the odour above described in the vicinity of the packages, they should be immediately thrown overboard; and it is important that the person making these examinations should know that leakages sufficiently large to be very dangerous may exist without its being possible to see anything in the nature of moisture on the outside of the drums to indicate their presence.

Sulphur Dioxide.

Dulphur Dioxide is neither combustible nor explosive, is not corrosive (in the sense in which aquafortis and oil of vitriol are), and is not "Dangerous Goods" within the meaning of section 446 of the Merchant Shipping Act, 1894. It extinguishes flame, but as it would produce suffocation in a confined space it should be carried on deck.

Liquid Ammonia.

Ammoniacal gas compressed into liquid form should be classed with dangerous goods, not only on account of the danger of explosion involved when it is not contained in vessels sufficiently strong to withstand the pressure which may be produced by a rise in temperature, but also on account of the highly dangerous nature of the gas.

The following precautions should be adopted when this liquid is carried on board ship:—

It should only be packed in iron vessels which have been satisfactorily tested up to a pressure of 675 lbs. per square inch, and should be stored in a part of the ship beyond the influence of any heat from boilers or furnaces, and remote from the living quarters.

The aqueous solution of ammonia of a specific gravity of ·880 at 60° F. should be conveyed in drums not exceeding 12 gallons in capacity, with an empty space equal to 5.33 per cent. left in each drum. There is no objection to the use of enamelled drums.

If for carriage on board ship, the drums should be capable of withstanding a pressure of 66 lbs. per square inch, and should be packed in cases with not more than four drums in a case, the interstices being filled with sawdust.

But for short voyages, such as to Ireland or the Continent, the drums need not be packed in cases.

At a temperature above 130° F. the expansion of liquid ammonia is rapid, and a risk of explosion much increased.

Care should therefore be taken not to expose drums containing this liquid to the rays of the sun or to the influence of heat from boilers. It should be carried well away from the living quarters, as deck cargo only, and should not be covered with black tarpaulin.

Ammonia solution of a specific gravity of ·959 and upwards is exempted from the operation of the above instructions.

Small quantities of liquid ammonia for pharmaceutical purposes may be carried in glass bottles, if stowed with such precautions and in such places above deck as may be approved by the Board's officers.

Dinitrobenzol.

Dinitrobenzol, although a constituent of certain powerful explosives, presents, when unmixed with other substances, no features that may be described as dangerous. It is unnecessary to lay down any special rules with regard to its carriage on board ship.

Naphthaline.

Naphthaline is not an explosive and no special risk attaches to its conveyance.

Liquefied Carbonic Acid.

If cylinders of carbonic acid are carried as cargo, it is recommended that the shippers should be asked to produce a certificate to the effect that the recommendations of the Home Office Committee of 1895 on compressed gas cylinders have been complied with.

If carbonic acid is used in a bar on board a passenger steamer, the whole apparatus, including the cask containing the beer and the bottle containing the carbonic acid gas, should be enclosed in a cupboard made of stout material and provided with a close-fitting door, well secured; the cupboard should be ventilated to the open air by means of a pipe of not less than 2½ inches diameter, and the upper end protected by a goose neck. The apparatus should not be fitted in or near to any sleeping accommodation under deck, and should be placed in as cool a position as possible.

The pressure gauge, and the key for turning the valve of the bottle, should be outside the cupboard.

It is assumed that only one cylinder will be used at a time, that it does not contain more than 20 lbs. of gas, and that it complies both as to materials and test with the recommendations of the Home Office Committee.

Matches.

Vestas may not be carried on emigrant ships. There is no objection to their shipment on other vessels, provided they are packed in tin-lined air-tight cases.

Safety matches may be carried on emigrant ships if packed in zinc or tin-lined hermetically sealed cases, and stowed in the square of the hatchway.

Oiled Materials.

There is reason to believe that materials which have been dressed or soaked with oils, either raw or boiled, such as oiled clothing, oiled silk or cotton goods, oiled paper, etc., whether in the piece or used for packing purposes, are liable to spontaneous combustion, more especially if the goods are newly manufactured and have been insufficiently dried.

Cases containing oiled goods intended for exportation as merchandise should be perforated or otherwise ventilated, and should be marked as required by section 446 of the Merchant Shipping Act, 1894.

When oiled materials are used for packing care should be taken to see that they have been properly dried, and that the various folds do not overlap in such a way as to bring several thicknesses of the material together.

If oiled goods are carried under deck, they should be stowed in a cool place, and where they can be readily got at.

Oiled clothing is sometimes packed in hermetically sealed metal-lined cases with the object of excluding air from the goods. If the soldering is carefully attended to, and if the goods have been seasoned for at least a month after manufacture, it is believed that there will be no risk of spontaneous combustion.

Inodorous and other Felt.

Inodorous felt is generally made from the refuse of flax or jute treated with resin previously moistened by mixture with oils of various descriptions (including paraffin).

At a special meeting of the Felt Makers' Association held in London in January, 1885, attention was called to the frequent occurrence of spontaneous combustion in Inodorous Felt on board ship, and the following Resolutions were unanimously adopted :—

1. That inasmuch as Inodorous Felt is liable to spontaneous combustion, in future, no Inodorous Felt be shipped to foreign ports.
2. That the following notice shall be placed on all letters relative to Inodorous Felt for shipment abroad :—
   " Inodorous Felt being liable to spontaneous combustion should not " be shipped for transmission abroad, but if you wish to do so please " see the Merchant Shipping Act of 1894, sections 446 and 447."
   This notice to be printed in red and pasted on the invoice of all orders where there is the slightest suspicion that it is intended for transmission abroad.

It was also subsequently agreed to mark prominently on each frame the words " Inodorous Felt," in red letters 1½ inches long.

Inodorous Felt may not be carried at all on emigrant ships. When carried on other vessels, it should, if stowed under deck, be placed where it is easily accessible ; it should on no account be treated as general cargo and covered with other goods.

Inodorous Felt should not be confounded with tarred roofing and sheathing felts, from which it can generally be distinguished by its lighter colour.

No definite rule is laid down with regard to sheathing and roofing felts, but it is advisable that they should, if carried under deck, be stowed in the square of the hatchway, and should be mentioned in the Master's letter so that they can be jettisoned in case of fire.

In 1903 a fire occurred on board a vessel which carried two consignments of felt, viz., one of black sarking felt, made from flax waste, coal tar, and coal-tar pitch, and the other of brown sheathing felt, made from jute waste, Archangel tar, and resin. The two consignments were stowed together, and the fire was clearly due to spontaneous combustion. The Board were advised that there was nothing in the ingredients of either felt which would predispose them to spontaneous combustion ; that the black felt made from coal-tar and pitch was quite safe ; but that if the rolls of brown felt were packed in the hold of a ship before they had cooled to the temperature of the surrounding air, there would be risk of spontaneous firing.

Lampblack.

Spontaneous combustion in the case of Lampblack is extremely rare, but there is a possibility of it taking place, and it is therefore recommended that lampblack should be stowed near the hatchways, and where it is protected from the wet.

Printed paper should not be used for packing lampblack. If it is put up in paper parcels and packed in casks, or in caskss imply lined with paper, or in cases or drums, it may be carried on board ship with comparative safety.

Carbon Papers.

Carbon papers which contain fatty substances and finely-divided carbon, or compounds of carbon, are liable, under certain conditions, to some risk of spontaneous ignition.

If a limited number of sheets are packed in air-tight tins within a suitable case, no objection need be raised to their carriage as general cargo.

If carried in any quantity and not packed in such tins they should be carried as deck cargo only.

Typewriting carbon papers, which do not contain free carbon, are not open to the same objection and, if they are interleaved with plain paper, and, when in large quantities, packed in tin-lined cases, there is no objection to their carriage as general cargo.

Glue Pieces.

The Court of Inquiry which investigated the circumstances attending the abandonment on fire of the ship " Hollinwood," laden with wool, tallow, glue pieces, etc., from Sydney, New South Wales, found that the fire broke out in the glue pieces stowed in the 'tween decks, and that the fire might possibly have been due to spontaneous combustion. Dr. Dupré informed the Court that he had experimented with the specimens of various articles forming the vessel's cargo, and found that with a mixture of wool and glue pieces, at a temperature of 250° Fahrenheit, there was a tendency to spontaneous combustion. He deduced from these experiments that the fire on board the vessel probably resulted from hair being mixed with the glue pieces, such as might be adhering to the ears and portions of hides of animals of which the bales of glue pieces were composed.

Another case has since been brought to the notice of the Board of Trade in which a fire broke out in the centre of a consignment of glue pieces stowed in the 'tween decks, and the fire was attributed to spontaneous combustion

Carbide of Calcium.

Carbide of Calcium being " dangerous goods " within the meaning of Section 446 of the Merchant Shipping Act, 1894, should, in addition to being marked as required by that Section, be packed in hermetically sealed tins enclosed in strong wooden cases, or in air-tight and damp-proof iron drums, and should be stored in the most easily accessible part of the ship, all necessary precautions being taken to keep it dry.

In the event of such precautions not being taken the vessel is to be deemed to be improperly loaded and should be detained as unsafe if any attempt be made to proceed to sea.

The risks attendant on the conveyance of carbide of calcium may be expressed as follows :—

When water is brought into contact with carbide of calcium it gives rise to a rapid and copious evolution of acetylene gas. This gas, with air, forms a violently explosive mixture. Obviously, therefore, if carbide of calcium is not stowed in such a way and in packages of such a character that water cannot possibly have access to it, a very grave risk may ensue ; and in the confined space of a ship's hold, or indeed, anywhere on board ship, this risk might be of a most formidable character.

In addition to the danger of explosion from the resulting gas there is also a fire risk, inasmuch as when water in small quantities comes in contact with the carbide, there is a considerable development of heat, and, under certain conditions, the temperature may rise to a dangerous degree.

" Acetyloid " differs only in degree from carbide of calcium, and should be packed and stowed in the same way.

DATES.—The fruit of the date palm, which in some countries forms the chief food of the inhabitants, as well as of animals. The best kinds are those obtained from Maskat and Basorah. Dates usually ripen in the Persian Gulf from August to September, which is considered the hottest time of the year.

Fine dry dates may be stowed among other cargo. Wet dates should be kept away from goods liable to damage, as they often drain and evaporate large quantities of moisture on the voyage. Entire cargoes of this fruit are shipped direct to New York from Maskat and the Persian Gulf.

Fancy boxes of Dates from Marseilles, each 143 lbs., 20 cwt. stow in 88 feet.

Dry Dates are generally packed in gunnies or boxes.

Wet Dates in mat bags, or baskets.

Never stow Wet over Dry Dates.

20 cwt. of Dry Dates stow in about 45 cubic feet.

20 cwt. of Wet Dates in 40 feet.

DEAD FREIGHT.—The damage payable by one who agrees to ship cargo, or engages to load a ship, and fails to do so.

DEAD WEIGHT.—This term applies to all goods, the cubical contents of which are less than 40 cubic feet to the ton weight. It is sometimes agreed in charter parties that Coal shall not be considered dead weight.

The Editor of "Fairplay" states:—"There is a very mixed notion of what constitutes dead weight. Some affirm that it means cargo only, and that bunker coal, etc., is additional; others that it includes bunker coal and cargo, but not stores. As the matter is one of great importance I may as well say in as few words as possible that dead weight depends on two things—displacement, and the 'equipped weight' of vessel. The displacement at whatever may be the draught is equal to the weight of the ship and all on board of her. The equipped weight of a vessel is the weight of the hull complete with all outfit, plus the weight of the machinery, boilers, water in boilers, and spare gear as required by Lloyd's or the Board of Trade. All over and above this constitutes dead weight. For example, we say such a vessel carries 7,000 tons d.w. at her load draught, or in other words she carries, say, 5,000 tons of cargo, 1,750 tons of bunkers, and 250 tons of provisions, water, and any other effects, making in all 7,000 tons. In sailing ships the equipped weight is the weight of the hull, spars, rigging, etc., with the holds swept clean; all over and above is dead weight, cargo, etc.

There is also measurement cargo, which depends wholly upon the nature of the goods carried, as to the number of cubic feet which constitute a ton.

"It is very important that the signification of the term 'dead weight' should be perfectly understood, as we have known of many disputes on the subject, more especially amongst foreigners, who stipulate that the vessel should carry so many tons dead weight on a fixed draught. Towards the completion of the vessel they begin to load her with stores of every description for a long voyage, and when at the last they fill up with coal and find that she will not carry the dead weight on the arranged draught, they turn round on the builders and threaten pains and penalties of every kind, and possibly sail at last with the firm conviction that they have been in some way outwitted. In conclusion I can only once more try to make it thoroughly plain to those interested, that when they contract for a vessel to carry so many thousands of tons dead weight on a certain draught, they must understand that there is included everything over and above the actual weight of the vessel ready for sea, with only the necessary spare gear required by the Board of Trade, and with the boilers filled."

DECK CARGO.—Unless signed for in the B.L. as "*On Deck at shipper's risk*," owners are held liable for safe delivery, notwithstanding any law or custom of the trade which may tend to the contrary.

This is an important point, and one that should never be overlooked by vessels carrying deck loads. Deck cargo can generally be insured against loss at moderate rates, provided the risk is not very great or unusual. Before receiving heavy deck loads the upper deck beams should be strengthened by stanchions or supports from below. In the event of the saloon and cabins being under the deck, stanchions should be placed at different intervals, as required. The main deck scuppers or waterways should be kept clear, and room enough left for anyone to get at them to clear out any rubbish which might accumulate and block them on the passage.

All articles carried on deck should be well lashed down and secured before starting on a voyage, and while in smooth water. Chain lashings should be used to bind timber, etc., well together. They should be taken from side to side, the ends being secured to a permanent part, such as a bollard or heavy ring-bolt, etc. This is especially necessary when the crew have to work the ship on top of it. Temporary rails and life-lines should be constructed fore-and-aft.

Timber should never be allowed to bear any unequal strain on the ends; the weight should be equally borne along the entire length. It is unsafe in the extreme to carry a heavy deck load. In smooth water it seems all right, but in dirty weather, during dark, stormy nights at sea, it is a source of much danger to all on board.

Sec. 451 of the Merchant Shipping Act, 1894, enacts that—"Any vessel arriving at a U.K. port between the last day of October and the 16th day of April, from any port out of the U.K., carrying a deck load more than three feet high of deals, or light wood, may have to pay a penalty of £5 for every 100 cubic feet so carried. This does not apply to vessels in distress seeking shelter."

DEMURRAGE is a compensation payable for the improper detention of a vessel by the charterers or their agents. The word demurrage means the agreed additional payments (per day) for an allowed detention beyond a period specified in the agreement. It has also a more general meaning, of compensation for undue delay or detention.

DESKS, DRAWERS, etc.—Cases received at New York gave the following results:—

One case weighed 505 lbs. and measured 51 ft. 4 ins.

One case weighed 504 lbs. and measured 62 ft. 8 ins.

One extra case weighed 515 lbs., and measured 2 ft. 10 ins. by 3 ft. 9 ins. by 4 ft. 10 ins. = 51 ft. 4 ins.

In stowing they should be kept dry and away from articles of a damp or oily nature.

DHOLL.—20 cwt. in bags stow in about 50 cubic feet.

DIAMONDS.—The Cape Colony has exported, since the first discovery of diamonds in South Africa in 1867, more than 50,000,000 carats of the precious stone, representing a value of £70,000,000. This enormous quantity would weigh more than 10 tons, and if piled in a heap would form a pyramid 6 feet high with a base of 9 feet square.

The biggest diamond was found in Jagersfontein Mine and is named the "Jagersfontein Excelsior." This is now the largest and most valuable diamond in the world. It is of blue-white colour, very fine quality, and measures 3 inches at the thickest part. The gross weight of this unique stone was no less than 969½ carats, and the following are its recorded dimensions:—Length 2½ inches, greatest width 2 inches, smallest width 1½ inches, extreme girth in width 5⅜ inches, extreme girth in length 6¾ inches. (*See* **Gold Specie.**)

DRAGON'S BLOOD, or GUM DRAGON.—A resinous exudation from trees or their fruits: it is used for various purposes of manufacture. Should be stowed as a resin in a cool part of the vessel. From India it is generally exported in cases, six of which go to a ton of 20 cwt., and stow in about 120 feet.

Chinese boxes containing one picul measure 7 to 7½ feet.

20 cwt. in 90 feet.

DRAUGHT OF WATER.—Sec. 436 of the Merchant Shipping Act, 1894, directs:—(3.) The master of every British sea-going ship shall, upon her leaving any dock, wharf, port, or harbour, for the purpose of proceeding to sea, record her draught of water and the extent of her clear side, in the Official Log Book (if any), and shall produce the record to any chief officer of Customs whenever required by him, and if he fails without reasonable cause to produce the record shall for each offence be liable to a fine not exceeding Twenty pounds.

(4.) The master of a sea-going ship shall, upon the request of any person appointed to record the ship's draught of water, permit that person to enter the ship and to make such inspections and take such measurements as may be requisite for the purpose of the record; and if any master fails to do so, or impedes, or suffers any one under his control to impede, any person so appointed in the execution of his duty, he shall for each offence be liable to a fine not exceeding Five pounds.

(5.) In this Section the expression "clear side" means the height from the water to the upper side of the plank on the deck from which the depth of hold as stated in the register is measured, and the measurement of the clear side is to be taken at the lowest part of the side.

The Board of Trade Regulations dated January 12th, 1899, repeal those dated June 22nd, 1896, and prescribe the use of certain disks and lines for marking the load-line in the different seasons. A certificate of the Survey must be exhibited on board.

DRUMS, or CHINESE TOM-TOMS.—Packed in cases measure 13 to 16 feet; weight varies according to size, etc.

DUNNAGE.—Before receiving cargo on board ship, the holds should be carefully provided with an adequate amount of dunnage, and this should be laid under the direct supervision of an officer of the vessel, and not left to irresponsible parties. An entry of the amount, etc., should be made in the Stowage Book.

When selecting dunnage care should be taken to use good, sound,

clean wood only. Any previously used for stowing oil, grease, or other objectionable articles should never be used a second time for stowing dry goods.

All wood used as dunnage should be perfectly dry, and great care should be taken in its selection, for although to the unpractised eye it may seem all right, moisture may be present, and when the hold becomes heated evaporation takes place, and may injure certain kinds of cargo. Never let sawdust remain in the hold on this account. Prefer rosewood to logwood, or get redwood, as it is much heavier.

"Stevens on Stowage" says:—

"Avoid as far as possible loose dunnage, such as faggots and brushwood. The great secret of keeping dunnage right is to give careful attention to the pumps, keeping the hold clear of water."

There seems to be no rule by which coal, cutch, horns, bones, green bamboos, or other articles of a like nature may not be used as dunnage, and though it may be a common enough practice in certain trades to do so, yet should damage arise and a survey be called, the vessel might be held liable for improper stowage. Rattans, bamboos, or other kinds of reed make fairly good dunnage for light freight, but are liable to collapse under a heavy pressure. If used, an extra thickness is desirable to compensate for want of strength and stability. No hard-and-fast rule can be laid down for dunnaging vessels of the present day. The following is, however, about the amount required for general cargo:—

No less than 6 inches on the floor.

From 8 to 10 inches on the bilges.

From 1 to 1½ inches on the sides.

From 1½ to 2½ inches on the caulked 'twixt decks.

Except in certain parts, vessels having grain-lined ceilings, b llast tanks or double bottoms, do not require any. Cargoes of jute or rice, etc., require to be dunnaged on the sides of the holds right up to the deck to allow the sweat to run down clear of the bales. Mats only are of little use between the bales and the ship's side; they rather tend to make matters worse by getting rotten and turning black. It is much better to have one to two inches of dunnage, which will generally prevent serious damage in this respect.

If at the end of the voyage any cargo is found to be damaged, there is no getting out of the difficulty should it be found stowed without dunnage. The liability rests with the ship. Sailing ships require more dunnage generally for long voyages than steam vessels, and they should increase the amount round the masts, water-tanks, etc.

DYES.—When coal is heated in the manufacture of gas, benzine is one of the substances produced. From this an oily, colourless fluid, called *Aniline*, is made, and it forms the base of numerous dyes. The colours produced include every shade and tint. Aniline blacks are usually very intense blues. Manufactured Dyes are generally shipped in bottles or jars packed in cases, but only in small quantities. (*See* **Apothecary Ware.**)

20 cwt. stow in about 80 feet.

DYNAMITE.—It should be noted that extremes of temperature, such as intense heat or cold, render this article extremely sensitive and liable to explode. Detonators are generally packed in sawdust. Each tin contains about 100 caps. They should never be stowed with the dynamite, but be kept by themselves. Great care should be used in handling cases of dynamite not to knock or throw them down roughly, or they may explode.

It is thought that dynamite will not explode when fire is applied to it, but only by the action of a detonator. The crew of the Liverpool barque "BRITISH MONARCH," which took fire while on a voyage from Hamburg to Sydney, were wise enough not to trust to this opinion. They had ten tons of dynamite on board the vessel, and when the crew discovered the fire they tried to get at the explosive to throw it overboard. Failing this, they wisely took to their boats, remaining near the ship. They put off from the vessel about 4 p.m., November 20th, 1889; at 1 a.m. the next day the fire reached the dynamite, and an explosion of a terrible kind followed. Pieces of burning ship were shot up in the air so high that the officers of the whaling barque "CANTON," being 130 miles off, saw the burning wreckage dropping through the air, which they at first thought were falling meteors.

When lying at anchor in any port of the U.K. with explosives on board, it is necessary to have a continuous look-out on deck night and day. (*See* **Explosives.**)

EARTHENWARE.—In bulk or crates requires careful stowage. 20 cwts. in bulk will average about 125 feet; jars, in crates, in 47 feet. Earthenware retorts, loose, 20 cwt. stow in 58 feet. (*See* **General Cargo.**)

EBONY.—A hard, heavy, black wood, the centre of a tree shipped from the East Indies and East African ports. Used as dunnage and weight in many instances, and is easily handled. It is a valuable article, generally shipped in pieces from 4 to 6 feet long, weighing about 50 to 70 lbs. Care should be taken in tallying it in and out

of the ship. Forked or crooked pieces are often difficult to stow, and take up a great deal of unnecessary space.

EDIBLE BIRDS' NESTS.—Should be carefully stowed apart from articles liable to damage. (*See* **Nests, Edible.**)

EGGS.—Generally shipped in casks, cases, crates, or jars. Fresh eggs in cases of various sizes. Take every care in handling cargo of this nature, and do not allow it to be used for blocking off other goods where it would be liable to excessive pressure or weight. Eggs are generally preserved in salt, lime, or bran. Shipments of eggs packed in large earthenware jars are made from the Coromandel and Chittagong coasts to Burmese and Arrakan ports; each jar contains from 500 to 1,000 eggs, packed in lime or chunam; the outside is protected by a network of ropes made of grass, and worked round from the neck to the bottom, the two ends forming a grummet or strop which is used to hoist the jars in or out. Great care is necessary in handling such fragile articles; the least knock will break the whole thing to pieces.

In stowing, one height is all you can get. Have each package carefully wedged off to prevent shifting at sea.

Stow nothing on top, as the packages will stand no outside pressure. This kind of cargo should be carried only at shipper's risk.

ELECTRIC TELEGRAPH CABLE.—Stow in large circular water-tight iron tanks, etc.; coiled, and under water.

ELEPHANTS' TEETH.—In bundles, cases, or loose.

Being a valuable article it should be stowed in a safe place. Oil, grease, or acid has an injurious effect in destroying the colour and value of ivory.

EMERY STONE.—Nearly equal in weight to ordinary iron ore. It is found with other minerals in large quantities, is not affected by heat or cold, and is not injured by contact with other goods.

ESPARTO GRASS.—Generally known as *Alfa*. In its wild state it resembles prairie grass, only the stems are longer and thicker when full grown. It is packed in bales.

Spontaneous combustion has taken place on board one or two ships loaded with Esparto grass; they were burned, and had to be abandoned at sea. Sailing vessels carry about two-thirds of their registered tonnage (including deck load) of pressed bales. Sufficient ballast is absolutely necessary.

A steamer carries of weight from 75 to 85 per cent. of her registered net tonnage, the latter being considered the maximum for a good carrier. A variation of these figures will occur according to the condition and texture of the grass when shipped. In most instances the weight turns out short on delivery.

ESSENTIAL OILS, etc.—Essential Oils (or Ethereal Oils) are substances which in their chemical composition differ from common oils, but are allied to resins, into which they insensibly merge at ordinary temperatures. They possess a burning taste and pungent odour; sparingly soluble in water, they dissolve readily in alcohol, common oil, etc.

The following is a list of the principal Essential Oils:—Orange, Neroli Bergamot, Lemon, Lime, Pepit Grain, Bitter Almond, Lavender, Rose, Peppermint, Mint, Rosemary, Marjoram, Thyme, Carraway, Anise, Sweet Fennel, Cajaput, Sassafras, Cinnamon, Cassia, Cloves, Pimento, Nutmeg, Sandalwood, Rosewood, Geranium, Winter Green, Patchouli, Vetiver, Citronelle, Cedarwood, Juniper, Calamus Dromiticus, Mustard, and Lemon Grass.

In receiving Essential Oil for stowage, remember they are generally of great value, consequently demand careful handling; they are also highly scented and pungent, so that notwithstanding however well and carefully packed, they will certainly impregnate other articles in the same compartment. Extra consideration is therefore necessary. (*See* **Oil.**)

20 cwt. in iron drums, with wooden bands outside, stowed in 50 cubic feet.

Essential Oils from Canton, Cassia, Peppermint, Aniseed, in cases. Case contains either one large tin (usually), or glass bottles packed in paddy husks; measurement, 3 feet per case, and weight half-picul net:—

Cassia Oil is valued $290 to $300 per picul.
Peppermint ..... $400 ,, $500 ,, ,,
Aniseed Oil ..... $400 ,, $500 ,, ,,

EXPLOSIVES.—Any article of a dangerous or explosive nature should only be received on board as cargo under special arrangement; then promptly stowed in its allotted place. For instance, powder, dynamite, gun-cotton, etc., should be stowed away as it comes over the side, and not left lying about the deck waiting for work to be done that should have been arranged for and finished previous to its arrival. Rockets, blue-lights, and other explosives for use on board ship should be kept in their magazines, and when received or landed should be carefully handled. No smoking or lights of any kind to be allowed when such articles are about.

In Colombo, Galle, and other Eastern waters, the following rule is enjoined within the limits of the ports :—" Vessels with more than 5 cwt. of explosives on board not to enter harbour unless explosives are in a magazine."

When Government powder or combustibles are shipped for conveyance under the Admiralty regulations, a magazine is considered necessary by the authorities ; and the owners are paid freight on the external measurements, not on the tonnage only of the powder or combustibles. A magazine, however, is not often required for small quantities. (*See* **Gunpowder.**)

Caution.—Stowage of Signals of Distress : Master and Owners of emigrant vessels are informed—

(1) That nothing whatever, of any kind, whether explosive or otherwise, should be carried in the same magazine or receptacle with gunpowder.

(2) That nothing whatever of any kind, whether explosive or otherwise, should be carried in the same magazine or receptacle with signals made of " gun-cotton " or " cotton powder."

(3) And that rockets, blue-lights, and all " fire-works " should be carried in separate boxes, which should not be kept below the weather deck.

(4) The Board's officers have been directed to see that the above instructions are complied with before granting clearances to emigrant ships, or declarations to passenger steamers.

(By order of the Marine Department, Board of Trade.)

EXTRACTS FROM THE REGULATIONS FOR THE CONVEYANCE OF GOVERNMENT STORES THROUGH THE ADMIRALTY SHIPPING AGENTS. Issued by the Admiralty, August, 1905.

EXPLOSIVES.

20. Explosives shipped by Government are divided into three Groups, which are sub-divided into Divisions. A label will be affixed to each package denoting the group and division to which the contents belong.

Explosives for Naval Service are subject to the same regulations as those for Army Service, but are to be stowed in separate magazines or partitioned-off spaces.

The Shipping Agents' Surveyor will select the position for the magazines, and, when magazines are not required, the places where the Explosives are to be stored.

The magazines, portable magazines or boxes, and partitioned-off spaces for Explosives not requiring magazines are to be constructed by the Owners at their expense. . . .

The construction is to be in accordance with the Specification, Appendix B, and is to be subject to the approval of the Ordnance Officer of the Department shipping the stores, to whom the Owners are to give two clear working days'

notice of the date on which the vessel will be ready to receive the Explosives. The port regulations for the shipment of Explosives are to be adhered to.

All ships with wooden masts, conveying any quantity of Explosives of Group I., are to be fitted by the Owners with a Lightning Conductor at the Main, and with additional conductors if specially ordered. In the case of ships built of iron or steel, and having iron or steel masts, with wire rigging from the mast head making direct contact to the hull, Lightning Conductors are not required where the quantity of Explosives to be carried is under 50 tons ; but when 50 tons or over are to be carried, one or more conductors are to be fitted, as may be deemed necessary by the Surveyor.

Lightning Conductors are not required in the case of Explosives of Group II. or III.

21.—(*a*) The Explosives comprised in Group I. (except as provided in *Section* (*e*)) are to be placed in magazines to be built in accordance with the Specification, page 73 ; and the following classification denotes how they are to be stowed in the several magazines :—

GROUP I.*

Division 1.—	Cordite in bulk	May be placed in one magazine and with Group III., Division 3.
	Cordite cylinders without igniter ...	
	Ballistite	
	Gunpowder, except that which has been wetted	
	Cannon cartridges filled with gunpowder, ballistite, or cordite; except Q.F. cartridges but including all charges for Q.F. cartridges.	
	Puffs, powder	
	Igniters, powder	
	Cordite cylinders fitted with igniter	
	Bags, primer, filled	
	Charges and primers, impulse torpedo	
	Fuze, instantaneous	
	Quick match	
	Stars, incendiary	
,, 2.—	Guncotton, dry	May be placed in one magazine.
	Dynamite	
	Exploders, filled, for lyddite shell ...	
	Blasting gelatine	
	Tonite	
	Gelignite	
,, 3.—	Picric acid	Must be placed in a magazine by itself.

(*b*) All the magazines are, as far as practicable, to be placed so as to be approached by, and contiguous to, the same hatchway; but they are to be as far apart as possible and with suitable cargo between them, and no other stores are allowed to be placed with the Explosives in the magazines.

(*c*) The magazines for Divisions 2 and 3, when in steam vessels are to be placed so that there is a compartment with iron bulkheads between them and the engine-room or stoke-hold, or if there are not sufficient compartments to admit of this, though there are two hatchways in the length of the hold, they may be placed adjacent to the hatchway furthest from the engine-room or stoke-hold, but so that no part of a magazine is less than 30 feet distant therefrom ; and in all ships the magazines for these Explosives are to be placed 6 feet away from the ship's side and contiguous to the hatchway.

* Each package will bear a label having a red disc indicating the Group, the number of the Division being shown in the centre.

(*d*) Before Explosives comprised in Group I. are shipped on board steam vessels the furnace fires must be properly banked, and all other fires and lights extinguished. The shipments will be made under the personal direction of the officers of the Ordnance Department shipping the stores, by whom the key of the magazine scuttle will be delivered to the master.

(*e*) A magazine will not be required for quantities not exceeding 20 feet of Division 1, and 15 feet of Divisions 2 and 3, which quantities are to be stowed, easy of access, in a place of security to be approved by the Ordnance Officer of the Department shipping the stores. The packages of explosives of each Division will be placed in boxes, to be provided by the ship (as described in the Specification, page 73), and placed in position in the vessel.

(*f*) In sailing vessels engaged for the conveyance of explosives of Group I., the weight in tons of coal and patent fuel allowed to be shipped will not exceed one-fourth of the ship's registered tonnage when the quantity of explosive exceeds that specified in *Section* (*e*).

(*g*) The use of mineral oils for lighting purposes, except when special permission has been given for the useof a particular description of such oil (which must be in iron casks or tanks, and stowed where approved by the Shipping Agents' Surveyor), and the conveyance of "petroleum" or equally inflammable oils or spirits as cargo, are prohibited in ships engaged for the conveyance of Explosives of Group I., except when the quantity of explosives does not exceed that specified in *Section* (*e*). Spirits, such as rum, brandy, etc., and turpentine, varnishes, and similar articles in common use, are not, however, prohibited; but when shipped they must be stowed with two water-tight bulkheads between them and the magazine or partitioned-off space containing Explosives of this Group.

22.—(*a*) The explosives comprised in Groups II. and III. do not require to be placed in magazines, but must be stowed, whenever practicable, in a space partitioned off from the other cargo, divided, where necessary, into compartments, or in boxes.

When, however, as may happen in the case of filled shells, and mines, the weight renders it necessary, either for proper stowage or for handling, that such stores be stowed in the square of the hatchway, they are to be partitioned off from other cargo in such manner as may be found most convenient.

(*b*) The explosives of Groups II. and III. are sub-divided into the following Divisions, and are to be stowed in separate compartments of the partitioned-off spaces, as denoted against each Division :—

GROUP II.*

Division 1.—Balls, light, parachute		May be placed in one compartment.
Bursters, segment shell		
Caps, percussion		
Cartridges, small arm	which are safety cartridges.	
,, machine gun		
,, aiming tube		
,, signal, Very		
Cases, cartridge, quick-firing, capped and empty		
Composition, priming...		
Fuzes, time		
,, percussion		
,, time and percussion... ...		
,, electric		
,, safety		
Match, slow		
Portfires...		

* Each package will bear a label having a red diamond indicating the Group, the number of the Division being shown in the centre.

Division 1.—*Continued.* Primers, light G.S., and portfires life-saving. Primers, electric ... ... ,, shrapnel shell ... ... ,, vent ... ... Rockets (except war and life-saving) Service lights of sorts ... ... Tubes, electric ... ... ,, friction ... ... ,, percussion	May be placed in one compartment.
Division 2.—Gunpowder, wetted	May be placed in one compartment.
Mines and countermines, containing wet guncotton only	
,, 3.—Shells, filled and fuzed	May be placed in one compartment.
Rockets, war and life-saving	
Shells, fitted, but not fuzed	
,, 4.—Detonators	May be placed in one compartment.
Matches, Vesuvian	

GROUP III.*

Division 1.—Guncotton, wet (except in mines) ...	Must be placed in a compartment by itself.
,, 2.—Filled Q.F. cartridges containing a cap or percussion primer	Must be placed in a compartment by themselves.
,, 3.—Filled Q.F. cartridges, fitted with electric primers or adapters... ...	May be placed in one compartment and with Group I., Division 1.
Cartridges, impulse torpedo	

(*c*) When the quantity of any Division does not exceed 2 tons weight or measurement it will be placed in boxes, to be provided by the ship (as described in the Specification, page 73), and placed in a position in the vessel selected by the Shipping Agents' Surveyor.

23. The shipment on private account of any explosives other than those of the 1st Division of the 6th (Ammunition) Class under the Explosives Act of 1875, viz., safety cartridges, safety fuzes for blasting, railway fog signals, and percussion caps, is prohibited in vessels conveying Government Stores, without the permission of the Director of Transports. When the shipment is allowed, the explosives are to be stowed to the approval of the Government Officers, in the same manner as directed for Government Explosives of the same class in Articles 21 and 22, and the precautions and restrictions therein laid down are to be observed; but it will be sufficient if the packages and magazines comply with all the requirements of the Harbour Authorities under the Explosives Act of 1875.

SPECIFICATION FOR BUILDING MAGAZINES, PORTABLE MAGAZINES, AND PARTITIONED-OFF SPACES FOR POWDER, AMMUNITION, ETC., CARRIED AS CARGO.

Magazines and partitioned-off spaces are always to be built on 'tween decks if possible, and must be so placed that their doors are easily accessible from a hatchway.

* Each package will bear a label having a red triangle indicating the Group, the number of the Division being shown in the centre.

Magazines for gunpowder in barrels, and for picric acid or picric powder in barrels, should have all ironwork inside carefully covered with wood ; and all nails should be of copper or metal. For other explosives wood covering will not be required, and galvanized iron nails may be used. If required by the Surveyors, all ironwork inside to be effectively painted to their satisfaction.

Iron decks are to be covered with feather-edge boarding, which is to be an inch on one edge and ¼ of an inch on the other, and to lap over 2 inches.

Magazines.

The bulkheads to be formed of 1¼-inch fir boards secured to fir uprights 3 inches square, placed 2 feet apart, running from deck to deck and firmly secured top and bottom. When on iron decks the heels of the uprights to step on and be secured to a fir board 1 inch thick. The lining to run from upright to upright, on the inside of magazine, securely fastened with 3-inch nails, three to each board on each upright, extending from deck to deck, close-jointed and fitting closely between the beams. A board 9 inches by 1¼ inch to be securely fastened to the uprights at the upper and lower parts for securing heads of shores.

The doorway to be 3 feet 3 inches in width, with cant pieces 3 inches by 2 inches fitted and secured at the lower part to form a sill. The framing of doorway to have 1¼-inch rabbet on the inside formed by the uprights and lining, an additional thickness of 2 inches being secured on each side for a height of 2 feet 3 inches for the lower half door to run on, and chamfered at top on outside.

The doors to be made in two parts, to fit the width of doorway, and formed of two thicknesses of 1¼-inch board, the upper half to be 2 feet 6 inches, the lower half to be 3 feet in height, and be shipped from the inside. The boards forming the upper half door to be well fastened together crosswise by nails having their points turned on the inside, and punched in. The ends of the outer thickness to extend 2 inches beyond the ends of the inner thickness, and the inner thickness to extend 4 inches beyond the outer at the top and 2 inches at the lower edge, forming reverse rabbets. The boards forming the lower half to be secured to and kept apart 3 inches, by fir scantling 3 inches by 2 inches placed 6 inches in from each end, the inner thickness to extend 1¼ inch at each end beyond the outer thickness. Two hand-holds to be cut through the outer thickness of each half door for lifting purposes. When both parts of the door are in place, the space between top of upper half and lower edge of board for securing heads of shores to be filled in with 1¼-inch boards and securely fastened to the uprights. Both halves will then be secured by a strong hanging lock, hasp and staples, of metal or galvanized iron.

When any quantity over 30 tons is placed in one Magazine, uprights 3 inches wide by 2 inches thick in addition to above are to be fitted from deck to deck, and so placed that not more than 20 tons, as near as can be managed without breaking stowage, is in one undivided space. When a Magazine runs right across the vessel, uprights must be placed 3 feet apart along the centre line (fore and aft), and across the deck from side to side every 12 feet of the length. If considered necessary by the Surveyors these uprights should be connected by battens.

Should the height of the proposed magazine exceed 8 feet, the construction will be specially determined by the Surveyors.

Partitioned-off Spaces.

In partitioned-off spaces the uprights will be the same as for magazines ; they will be boarded up on the inside with 1¼-inch boards placed close together, running from upright to upright, and securely nailed with three 3-inch nails to each board to each upright. Door to be the same as for magazines.

Magazines or Partitioned-off Space Built on Cargo.

When it is necessary to build magazine or partitioned-off space on the cargo the selected space is to be levelled off, and the bottom formed of 3-inch by 3-inch quartering, placed 2 feet apart, covered with 1¼-inch boarding securely nailed. Uprights, 3 inches by 3 inches, 2 feet apart, running from the boards to the deck above, to fit taut and to be well driven in, cleated at the bottom and well tommed off at the top.

Remainder of magazine or partitioned-off space to be as detailed above.

Box or Portable Magazine for any Quantities up to Two Tons.

(Size in accordance with the dimensions of the packages to go into it.)

A frame to be made with 2-inch by 3-inch quartering, floored and boarded up on the inside with 1¼-inch boarding. Lid to be fitted with cleats on the inside to keep it in its place when shipped, and with hanging lock, hasp, and staples, of metal or galvanized iron.

Filled Shells.

When not exceeding 168 lbs. weight each, and packed in boxes, the partitioned-off space to be built as for other explosives of Group II.

For shells exceeding 168 lbs. weight each packed in boxes, and for loose shells, for any quantity over 5 tons the bulkheads to be of deals 3 inches thick by 9 inches wide, placed not more than 5 inches apart, to be cross-lined vertically with boards 9 inches wide by 1¼-inch thick, close jointed. For loose filled shells, in quantities of 2 to 5 tons, boxes to be made of 3-inch deals, sides and bottom and cover of 1¼-inch boards, properly secured. If considered necessary by the Surveyors, stronger scantlings are to be used.

When necessary to build partitioned-off space for shell on other cargo, bottom to be of 3-inch deals placed close together and crossed with 1¼-inch boards securely nailed.

When stowed in the squares of hatches, the shells are to be entirely covered with 1¼-inch boards. No cargo to be stowed on these boards.

Stowage.

Each division of Groups I., II. and III. of Explosives must be kept separate. No two divisions are to be placed in one magazine or partitioned-off space, except Group I., Divison 1, and Group III., Division 3.

6-pounder and 3-pounder ammunition is never to be stored more than three boxes high.

Barrels will always be stowed on their bilges, never on their ends.

FANS (not Palmleaf).—Packed in paper boxes, in cases (sizes vary) generally from 4 to 6 feet, weight according to quality.

FARINA.—A glutinous article, which should be treated as flour or starch, and kept away from moist or scented articles.

Boxes average 56 to 64 lbs., and measure 1 ft. 5 ins. to 2 ft. 3 ins. each. 20 cwt. of farina, in bags, stow in 54 ft.

FEATHERS.—Packed in bales or bags. Bales weighing 1 picul each measure 6 ft. 9 ins. to 7 ft. 6 ins. per bale.

FELT.—A kind of cloth or sheet manufactured from wool or other articles without weaving, packed in bales each 20 cwt.

FELT (inodorous).—A substance which is prepared from the refuse of flax, treated with a mixture of resin and oil. A very dangerous article to ship on account of its liability to spontaneous combustion. It is lighter in colour than the ordinary variety of felt, from which it must be carefully distinguished, as the latter, so far as is known, has no tendency to spontaneous combustion. This substance can only be shipped by special arrangement, and whenever it is stowed under deck it should be placed where it can easily be got at. It should never be treated as general cargo, or covered with other goods. All bales of this kind of felt should have the words " Inodorous Felt " printed in large red letters on the outside, so as to avoid all possibility of confounding it with the other article. (*See* **Dangerous Cargo.**)

The following are the particulars relating to a fire on board the SS. " GULF OF VENICE," caused by spontaneous combustion of this substance :—

" On the 15th October, 1883, the vessel being in the Indian Ocean, the Chief Officer reported that smoke was coming out of the forward ventilator on starboard side No. 1 'tween decks. At once directed the hatches to be taken off and had the fire-hose played in the part of the hold where the smoke was most dense ; after a few minutes, finding it had the desired effect, stopped playing water in the hold and began taking the cargo on deck ; after a short time came on the burning portion of the cargo, which was a bale of felt, and it was on fire right in the middle of one of the bolts of felt in a case. Had it removed on deck and thrown overboard.

" On the 17th October, while examining the forehold where the fire had been on the 15th, found another bale of same mark as that on fire before, very much heated and commencing to let out smoke. Brought it on deck, with six more of the same quality, and having cut them open found them greatly heated, over 210°. Deeming them not safe to store again with any other cargo, had them all hove overboard.

" On the 24th October found that fire had again broken out in the forehold No. 1. Got the cargo on deck from the lower hold, and got at the cause of the fire, a bale of felt. Got it on deck and hove it overboard. Stowed cargo on deck and covered it over with sails."

FENNEL SEED, and Fenugarick or Fenugreek Seed.—The *Trigonella Fænum Græcum*, an emollient ; poultices are made of the flour for veterinary purposes, and the Arabs use it in fomentations.

20 cwt. stow in 95 feet.

FIBRE.—A thread-like substance, obtained from various sources, generally shipped as light freight for broken stowage.

20 cwt. of bristle fibre, from Colombo, stowed in 80 feet.

20 cwt. of cocoanut fibre stowed in 120 feet.

FIGS.—Baskets from the Mediterranean ports average 55 lbs. each. 20 cwt. stow in 45 feet.

FINNON HADDOCKS.—Cases contain usually seventy-two 1 lb. tins, weighing in all 82 lbs. and measure 3 ft. 4 ins. each. 20 cwt. should stow in about 91 feet.

FIR CONES.—Kernels of this fruit shipped in cases.

20 cwt. stow in about 48 feet.

FIRE.—Fire is one of the most formidable enemies that sailors have to contend with. There are few old hands sailing who have not had more or less experience of it at some time or other. Many have had a fierce struggle for life ; others have known shipmates lost in the conflict, or linger on to a worse end by starvation and thirst in open boats, far from land or means of succour. The writer, when an officer in the ship " WINCHESTER," of London, had a narrow escape from such a fate. The remembrance of the terrible struggle for life of 500 men, women, and children will never be obliterated from his mind ; even after 25 years spent at sea it is as distinct as the day it happened.

In May, 1865, the " WINCHESTER " encountered a heavy gale of wind near the Line when homeward bound, having about 500 souls on board, including the ship's company and the 48th Regiment. At 2 p.m. on the day of the accident, the purser had gone below to get up the beer and spirits for the soldiers. The lamp he used was held by one of the men employed to assist him, and whether he dropped it accidentally or not is unknown. The rum which was being pumped out of a cask suddenly took fire, and the cask burst instantaneously. The liquid fire ran over everything, other casks rapidly ignited, and in a very short time the place was in flames. Volumes of smoke and flame poured out of the hatchway, rising almost to the height of the main top. In the square of the after hold were ten or fifteen tons of gunpowder in a large magazine, around which the fire spread with alarming rapidity. At the word " fire " all was terror and excitement on board, but in a short space of time everyone settled down to steady hard work. Pumps were rigged, water, wet blankets, etc., came regularly to hand, and after eight or ten hours of fierce combat the fire was got under and the ship saved. Without any doubt the

Almighty watched over that ship, for she would never otherwise have been saved. The outside of the magazine was burnt and charred by the heat and flame, but the inside lining was found intact.

The careless use of lucifer matches, smoking pipes or cigarettes in the holds by men employed there, a common enough practice in all foreign ports, should not be allowed at any time. Boat and fire drill should be gone through by the entire ship's company at least once a week. It has the effect of showing the men where to go, what to do and how to do it, and of keeping the boat's gear in working order, thereby preventing confusion in time of accident. Steam fire-extinguishers should be fitted if possible to each hold in vessels having steam or donkeyboilers on board. This is especially required for those sailing out of the United States ports with passengers.

Applying water to a fire in a vessel's hold, especially if she be fully loaded, is not only very difficult but often impossible. Attention is, therefore, particularly invited to the success of the San Francisco underwriters in saving the barque "WINCHESTER" and her cargo.

This vessel laden with general cargo for Portland, Oregon, returned from sea on fire. The hatches had been battened down to smother the flames, but in vain. Two useless efforts, several weeks apart, were made to put out the fire with water by the city fire department, and the owner was on the point of scuttling her, when the insurers obtained his permission to try the effect of carbonic acid gas. Half a dozen barrels of marble dust (a cheap material, but chalk or whitening would have done equally well) and three demijohns of muriatic acid were used by mixing them in water casks on deck, and conducting the resulting gas down the pump well by means of rubber hose fitted to the bungs of the casks; in three days the hatches were opened, and every particle of the fire was found to be extinguished. Moreover, no further damage was done to the cargo. The whole cost of this material was but a few pounds.

FIREARMS.—Packages containing articles of this nature should be stowed in a part of the hold set aside for such purpose, and away from any goods of a damp or heating nature. Loaded firearms should never be allowed on board ship unless under most exceptional circumstances, and then only in the hands of responsible parties.

Cases average 131 lbs. each, and measure 4 ft. 10 ins. each.

Masters of vessels are required to declare in the manifest a correct statement of all such goods. Guns, pistols, or ammunition, the private property of anyone belonging to the ship, should be entered on the store list, and not landed abroad on any pretext without a

written authority from the Custom House officials. Neglect of these precautions often causes confiscation of the goods and trouble to the ship.

FIRE-CRACKERS (Chinese) are packed in wooden cases (frail). Sizes vary from 11 inches to 6 feet per case. Safe and special stowage required.

FISH.—Small schooners and brigs are regularly employed to carry dried fish from St. John's, Newfoundland, to Spanish and other ports. The fish are packed in bulk, and stowed much the same as hides. The hatches are opened now and then to give ventilation below. The practice of giving away handfuls of fish as gratuity to pilots, boatmen, agents, and others who may in any way be connected with the vessel at different ports, is most reprehensible and may lead to trouble. At Naples, some time ago, the master of a Newfoundland schooner, having to prosecute some of his men for broaching cargo, was severely censured by the court for having, as he himself admitted, set the example by giving the Pilot and Custom House officers a quantity of dried fish as a gratuity.

Barrels 2 ft. 8 ins. by 1 ft. 10 ins. by 1 ft. 10 ins., about 9 feet, weigh 200 lbs. each.

20 cwt. of fish in cases stow in about 95 feet. (*See* **Herrings.**)

FISH MANURE or PHOSPHATES.—Packed in mat bags, or bundles tightly bound by grass rope; has a disagreeable odour, and breeds maggots, etc. Japanese bundles average 224 lbs. and measure 6 feet each. 20 cwt. stow in about 65 feet.

FISH MAWS.—In cases. 20 cwt. stow in 100 feet. There is an objectionable smell from this article.

FISH OIL.—In casks; weigh from 368 lbs. to 444 lbs. each, and measure 9 ft. 10 ins. to 11 feet each.

Packed in tin-lined cases, 20 cwt. stow in about 57 feet.

FLAGS, BUNTING, etc.—Average of packages containing these articles weighed 258 lbs., measured 5 ft. 8 ins. each. 20 cwt. should stow in about 60 feet. (Uncertain.)

FLAX.—In eastern countries flax is chiefly grown for the oil from its seed; in colder climates the fibre is principally used.

Flax, if damp, is said to be liable to spontaneous combustion. Stow as jute or hemp, away from articles of a greasy nature.

Baltic Ports, 20 cwt. stow in 155 cubic feet.

New York, 20 cwt. should stow in 108 feet.

Bale weighs 380 lbs., measures 18 feet.

Mats of Dutch Flax, 126 lbs. (*See* **Hemp.**)

FLORIDA WATER—Cases of Florida Water, in bottles, 15 ins. by 12 ins., about 1 ft. 3 ins.

Eau de Cologne.—Smaller cases, of bottles, 11 ins. by 20 ins. by 22 ins., about 2 ft. 10 ins.

FLOUR.—Articles of this nature will not stand rough handling nor should they be stowed among any but dry goods. Barrels run eight heights, after which nothing of a weighty nature should be placed on them. Lower tiers must have good beds and be bilge free; afterwards bilge-and-cantline.

Should a cask in the lower part be subject to any undue pressure, especially against the head, it will give way, break up, and start the whole lot adrift. This is not unusual in badly stowed cargoes in heavy weather.

Flour is easily damaged by any scented or objectionable article. It should never be stowed near tar, turpentine, or goods of an oily or damp nature.

American flour in bags will not stow as heavy as grain in bulk, but about the same as grain in bags.

Average weight of bags, 125 to 140 lbs., measure 3 ft. 3 ins.
do. ,, sacks, 224 to 280 lbs., measure about 5 ft. 7 ins.
do. ,, barrels, 217 to 219 lbs., measure 6 ft. 6 ins. to 6 feet. 11 ins.

10 barrels, or one ton of 2,240 lbs., stow in about 60 feet.
20 bags, or one ton of 2,240 lbs., stow in 44 to 50 feet.
East Indian bags average 167 lbs., and measure 4 ft. 2 ins.
Trieste in bags, 20 cwt. stow in about 52 feet.

FLUORINE.—A substance extracted from flint, and much used in the manufacture of glass. It has no smell or objectionable qualities. Cases weigh 56 to 63 lbs., and measure 2 ft. 3 ins. to 2 ft. 8 ins. each. One ton, of 20 cwt., stows in 82 to 108 cubic feet, according to quality.

FORGES.—Portable, 20 cwt. stow in 60 feet when carefully packed.

FREEBOARD.—*See* **Draught of Water.**

FREIGHT is the reward payable to the ship or owner for the safe carriage, right and true delivery of certain goods, as per Charter Party or Bill of Lading, at the port of destination.

Sir R. Phillimore says:—

"The general rule that freight is due only when goods are delivered at the port of destination is subject to exceptions, and these exceptions or modifications may arise out of the terms of an express contract, out of an implied contract, or out of the equity between the parties." (*See* **Bill of Lading.**)

FROZEN MEAT.—Cold is one of the simplest and least objectionable antiseptics that can be used in the case of food, and must not be confused with freezing, which deteriorates more or less the flavour of meat and game. In applying cold it is sufficient to preserve exactly the amount of chill that will suspend the vitality of the putrefactive organisms. Meat that is brought from New Zealand and Australia is frozen owing to the distance it has to come, but meat brought from America is simply chilled. Great Cold-Storage Depots are now established at the docks for the reception of frozen and chilled meats, pending arrangements with the dealers.

FRUIT.—The Italian, Spanish, and West Indian ports ship the most green fruit. Oranges and lemons are generally packed in boxes; the latter being heavier are generally placed below oranges, which are stowed on their sides.

The ventilation of fruit is a most important point to consider when loading for long passages. Once on board, it will rapidly heat and become rotten and valueless if not well ventilated. In a full cargo a space should be left under each ventilator, and air-shafts built with the boxes fore-and-aft the holds. Windsails should be put down the open hatchways whenever practicable. A continuous current of fresh air passing down to the bottom of each hold should be ensured, as the only means of getting rid of the foul, damp, and heated gases generated by the fruit, thereby keeping it in a cool and dry condition. Stevedores and others employed should understand stowing fruit cargoes, and, under the supervision of the officers of the ship, give every attention to the dunnage and ventilation, also to the correct and careful tallying of each box, as it often turns out short on delivery.

Boxes of oranges require loose stowage; 20 cwt. should stow in 90 feet.

Boxes of lemons are heavier than oranges; 20 cwt. should stow in 85 feet.

Boxes of melons, 20 cwt. stow in 80 feet.
Boxes of onions, 20 cwt. stow in 78 feet.
Boxes of raisins, 20 cwt. stow in 52 feet.
Boxes of currants, 20 cwt. stow in 50 feet.
(*See* **Bananas.**)

Captain Jamieson, on a voyage with fruit from the Mediterranean to New York, April, 1891, writes as follows:—

SS. "INDIA," Naples, 1891.

"**Green Fruit** requires great care and attention, both when loading and also during the passage—that is, for a long voyage.

"In the first place, care must be taken what cargo you have below, for some cargoes—viz., hides, rags, or coffee, etc.—will damage fruit by heating it.

"For ballast, stone, shingle, marble, and sulphur, also iron ore, are good, all being of a cool nature.

"When stowing the ship, keep four tunnels fore-and-aft in every other tier, at equal distance, say, about six boxes apart. Make one large shaft in centre of each hold, large enough to allow a man going right down to the bottom. Secure the boxes with planks shored across, and nailed, then there is no danger of shifting.

"Of course your fore-and-aft tunnels lead into this shaft, and a windsail set down to the bottom will send a current of air all through your cargo. In bad weather, when a windsail cannot be set, open the hatch, if only a few inches and if only for half an hour, but always avoid rain-water getting on fruit; a little salt water will not damage it much.

"Also avoid having any fine dry goods in the hold, especially macaroni, because fruit throws off a great quantity of steam, which will damage such articles."

FUEL (Patent).—A compound of small coal, tar, resin, and sawdust, etc., compressed into blocks like bricks. More used for locomotives and mills than marine work. It is dry, and easy to handle; has a very strong odour, consequently should never be stowed near any article liable to be damaged by contact. It stows well in the holds, but should not be roughly handled.

One ton of 20 cwt. stows in about 30 to 35 cubic feet.

FURNITURE should be carefully handled, and when stowed loose, without being packed in cases, should not be subject to any undue pressure.

It varies so much in size and weight that only a poor idea can be got from measurements generally. Average of 35 tons, in cases, gives 20 cwt. in 204 feet.

FURS, etc., should be treated very generally as valuable goods, and stowed in a dry, safe place. The Hudson's Bay Company ship their furs in boxes and bales.

New York bales about 3 ft. 11 ins., weight 70 lbs.
" " 6 ft. 5 ins., various weights.
" " 6 feet, various weights.

The finest and most costly furs in Russia are said to be **obtained** principally *via* London; the commoner sort belong to Russia itself.

20 cwt. of skins, in cases, stow in about 130 feet.

Many of the finer sorts go in tin-lined cases, and are considered valuable and choice cargo.

FUSTIC.—French and Spanish *fustoe*, from Spanish *fuste*, wood or timber—a name given to certain yellow woods employed in dyeing.

1. *Maclura tinctoria*, a large tree of the Mulberry family, native of the West Indies and Central America.

Cargoes of fustic are shipped from the Pacific Coast of Costa Rica and Nicaragua. It is in lengths varying from 3 to 6 feet, very heavy, but small and crooked, taking about 65 feet to the ton in stowing.

2. *Rhus cotinus*, a bushy shrub of the Cashew nut family, native of Southern Europe. It is used in dyeing and is called in the trade Young Fustic to distinguish it from the Maclura.

It is often shipped as broken stowage, also in bags, 20 cwt. stowing in 120 feet.

GALANGAL.—A species of aromatic root, something like ginger; dry and free from objectionable qualities generally. Galangal, shipped from China, packed in bags, weighs 133 lbs. net, or 95 catties, and measures 7 to 10 feet.

20 cwt. should stow in about 90 feet.

GALBANUM.—A resinous gum used in varnish, and also medicinally. (*See* **Gum.**)

GALL NUTS, or GALLS, vary much in form and composition, according to the plants on which they are formed and the insects producing them. Some varieties of Galls possess from 60 to 95 per cent. of Gallic and Tannic Acid, and are largely employed for manufacturing and other purposes. When shipped dry and clean they may be stowed among other goods, but in large quantities they are liable to heat unless well ventilated.

20 cwt. of Gall Nuts, in bags, should stow in 80 feet.

GALVANISED IRON and Corrugated Iron, packed in skeleton cases, 24 bundles measured 75 ins. by 61 ins. by 40 ins.

20 cwt. of above stowed in about 36 feet. (*See* **Iron.**)

GAMBIER.—A gum or extract prepared from the leaves of certain trees in the East; much used as a dye and for tanning purposes.

In stowing this article be most careful, for it will not only stick together when in bags, but the moisture will drain into the timbers and choke the pumps or any pipes round about. It will certainly damage other goods if not well protected by mats and dunnage. Stow in a place by itself when possible; otherwise put Gambier in the bottom of the hold with a good layer of sawdust over and under to prevent it sticking to the lining of the ship, and cover this over with mats and planks before stowing the most suitable cargo between it and dry goods. Protected as above it should be safe enough; there is, however, a somewhat stale smell noticeable in discharging other articles, which might have to be reckoned with in long voyages. (*See* **Cube Gambier**.)

20 cwt. Gambier in baskets stow in 120 feet.
20 cwt. Gambier in bags stow in 100 feet.

GAMBOGE.—A gum or resin used in medicine, also as a dye.
20 cwt. in cases stow in 68 feet.

GARLIC and ONIONS have a strong odour, considered by many highly objectionable, but not injurious. Articles coming under this heading should be well stowed as perishable, and have plenty of ventilation.

Cases of Spanish Onions, 20 cwt. stow in 78 feet.

GASOLENE.—*See* **Naphtha.**

GENERAL CARGO.—Weighty articles such as *machinery* should be stowed first, so that the various pieces may be made secure, placed in beds and properly attended to.

Coal should be stowed in the bottom, levelled off, and covered with boards, to prevent goods stowed on the top being soiled or rotted by contact. No dry goods should be stowed until all the coal is taken on board; the dust settling on them destroys their appearance and market value. Coal shipped damp is liable to damage dry goods.

Soda Crystals, Washing Soda, Bleaching Powder, Caustic Soda, Blue Vitriol and all Chemicals should be stowed by themselves, and never on top or contiguous to other goods. Caustic Soda and Chloride of Lime, especially, should be kept at a distance from bales, which are sometimes eaten through and rotted by the above articles.

Iron, whether in bars or in bundles, should be dunnaged in the bottom.

Sheet and Plate Iron should be stowed in piles, not spread, to avoid the damage which often arises from sweat running from one plate to another, and damaging the whole. When spread out, and cargo placed on the top, the plates and sheets are buckled up and twisted, destroying their market value and affording opportunities for litigation. When stowing iron keep the various marks separate by means of rope or wood. The usual paint-marks become obliterated on a long passage, when it is impossible to distinguish one brand from another; the iron has then to be separated, which causes great expense to the ship.

Bottled Beer in barrels, etc.—Care should be taken to prevent much weight, or many heights, being stowed one on the other; the lower casks are invariably crushed if overloaded by other goods. (*See* **Ale and Beer.**)

Bales should not be stowed on the top of bar iron, or allowed to come in contact with the beams or stanchions. The spring of the ship causes bales to chafe wherever they touch.

Crates.—Avoid stowing crates in the wings.

Manufactured Goods and goods of like value should have sufficient dunnage at the sides to leave a free water-course, for sweat to drain off. On no account use slightly-made packages for blocking off heavier cargo, but stow separately or over the other cargo. The fumes of many kinds of cargo injure others, which will easily be observed, and with care avoided. (*See* **Bleaching Powder.**)

Articles of value should be stowed in 'tween decks where practicable. Weight should, as far as convenient, be kept amidships, light cargo being reserved for the fore-and-aft holds. Caulked 'tween decks should have 2½ inches of dunnage, laid athwartships, not fore-and-aft. Mats can be used at the sides for tea, etc. Such articles as guano, superphosphate, turpentine, or bone-dust, etc., ought not to be shipped with a general cargo, more especially where a vessel has only one continuous hold, not divided by iron bulkheads. Endeavour to keep all your liquids, of whatever kind, as much in one part of the ship as possible; have good cross-beds at the quarters, well chocked with wood, and stow, if necessary, three heights of pipes or butts, four of puncheons, and six of hogsheads or half-puncheons.

The practice with some masters is to trust entirely to the stevedore for the stowage of a general cargo, subject to any special directions

from time to time through the chief mate. Remember the liability falls on the owner of the ship, the employment of a stevedore under no circumstances taking the responsibility off. Masters and Mates will do well to act for themselves even where stevedores are regularly employed, and send an officer into the hold to see that proper dunnage is laid and good stowage made. (*See* **Wines and Spirits, etc.**)

Castings, ornamental, 20 cwt. average 90 feet ; very uncertain.

Bridgework.—One span, shipped per SS. "MOUNT LEBANON," weighed altogether 222 tons, measured 111 tons.

GELATINE (Blasting).—Dimensions of boxes 27½ ins. by 10¼ ins. by 8¼ ins. Net weight of explosive 50 lbs. Gross weight of package about 70 lbs. (*See* **Explosives.**)

GENTIAN ROOT.—Packed in bales. 20 cwt. stow in about 130 cubic feet.

GHEE.—An oily kind of butter, prepared and used principally in the East. It should be treated as an oil, but stowed apart from articles of a scented nature, otherwise the flavour of the ghee will get injured and its value destroyed. Generally packed in second-hand casks or tins, which often leak on the passage. In such cases it is often difficult to know where to stow it. A safe place on deck might be resorted to.

20 cwt. in cases stow in about 60 feet.

GINGER.—The root of a plant, preserved in syrup and shipped in cases, which weigh 112 lbs., and measure 4 feet. The cases generally contain six jars, sometimes more. When stowing, especially among other goods, the cases should be placed mark uppermost, or the jars will leak and cause damage.

Dry ginger roots are shipped in small bags, often as broken stowage, and weigh from 112 to 140 lbs. each.

One ton of cases, 20 cwt., stows in about 80 feet.

GINGER, dry.—From Chinese ports, packed in bags, measure 6 to 7 feet, weight 1 picul net, $5 to $10 per picul.

GINGER, wet.—Packed in baskets shipped to India, weighing 50 to 70 catties each, measuring 3 to 5 feet. Value from $2·20 to $3 per picul.

GINGELLY SEED.—Sesame, Sesamum, or Gingelly, the *Sesamum orientale,* cultivated in the East Indies. Stow as seed.

20 cwt. stow in about 56 feet.

GINSENG.—The root of a plant grown in Manchuria and Korea, valued by the Chinese as a tonic and stimulant. Exported from Wi-ju on the Yalu River, packed in shallow, oblong baskets. Value up to $600 for the catty. Stow in a dry place as valuable cargo.

GLASS.—Glass is made from a mixture of Limestone, Sand, Soda, or Potash, Baryta, Arsenic, etc., finely ground and carefully mixed into a greenish black powder. This compound is then heated in a crucible, until it becomes a red-hot molten mass, which is poured out upon an iron table and rolled to the required size and thickness ; after this it is allowed a week to cool, then ground, polished and packed for shipment, etc.

Plate Glass packed in cases should always be stowed on edge, taking care to have the proper end up as marked. Much care is also required in slinging and handling such fragile articles.

Cases of Glass should always be stowed athwartships, and on edge. No dunnage should be used except in the wings to block off with. Dunnage is often used to level off a place where a case would not fill up ; the consequence is that it works down and causes damage.

20 cwt. bottles stow in 85 feet.

20 cwt. plate glass in cases stow in 41 feet. (Uncertain.)

Cases containing glassware average 20 cwt. in 110 feet to 200 feet.

Cases containing glassware 20 cwt. stow in 354 feet. (Uncertain.)

Cases of glass, 20 cwt. in 130 feet.

GLASS BANGLES.—From Chinese ports, packed in cases with straw inside. Measurements vary from 6 to 10 cubic feet each. Gross weight 90 catties to 125 catties. Cases are fragile and will not bear heavy weights or rough handling.

GLASS BEADS.—Shipped Japan and China ; packed with straw in fragile cases. Measure 1 ft. 9 ins. to 2 ft. per box. Net weight 133 lbs. Value $12·50 to $19·50 per case. Avoid rough handling.

GLUE.—Packed in casks. 20 cwt. stow in 125 feet.

GLUCOSE.—A sugar obtained from grapes and other sources. Barrel of glucose weighs 670 lbs., and measures 13 cubic feet. The barrel alone weighs 45 lbs. (*See* **Sugar.**)

In casks or barrels, one ton of 2,240 lbs. stows in 45 cubic feet.

In boxes, one ton of 2,240 lbs. stows in 42 cubic feet.

GLYCERINE.—A sweet liquid extracted from a fatty substance, packed generally in iron drums or tanks, often in bottles or jars.

Should be treated as moist cargo, and not stowed among dry articles.
20 cwt. should stow in 40 feet.

GOLD AND SILVER SPECIE, etc.—In the present day it is usual to ship specie by special agreement only, at a rate per cent. on the declared value, consequently in the event of loss through neglect or carelessness, the ship cannot be held liable for more than the actual declared value on which freight has been paid at time of shipment. In mail steamers, where specie is often carried in large quantities, the Chief Officer has usually charge of the department, and he alone has charge of the safe or strong room. The following routine is generally adopted :—Say £10,000 worth of specie and valuables are to be shipped afloat ; the specie nets are got on deck and carefully examined. To each net a 2-inch bucy-rope of the required length (depth of water) is securely attached. The nets are so made that the mouth closes when hove tight after the specie is in. The buoy-rope has nothing to do with the hoisting in, further than being attached in case of accident to close the net and mark the spot. When the specie boat arrives alongside, certain trustworthy persons are told off to receive it, and get it on board. The specie, checked off as it comes to hand, is carried and stacked just over the specie-room hatch, mark and number uppermost. An officer stands sentry over it, and when it is all there, the actual checking begins. The chief officer then examines every package separately in the presence of the shipper, especially the wrappers and seals, which must be in perfect order, entering the mark and number in his specie book as he passes them down below. When all has been received, the doors of the specie-room are closed ; the officer locks it carefully and tries the door several times to see if it is secured. The purser then makes the receipts out from the officer's notes, who again checks same with his books, and signs them, upon which B. L. are granted by the office.

It should never be forgotten that all receipts given for valuable packages should be worded " *Said to contain,*" or " *Said to value.*" Never sign for a certain value in such cases. It is usual to grant receipts on board for " contents and value unknown," it being impossible for an officer or anyone else to say what is in a package into which he cannot look. One thing, however, he can do, and it is of the first importance, viz., to see that the seals and covering of each package are intact and in perfect order. Again, on getting his receipts for the different parcels on delivery, the words " seals and packages in perfect order and condition, marks and numbers as per

receipt " should always be insisted upon. Never take a doubtful receipt.

Never take over the specie-room key from an officer or anyone else without numbering and examining every package for yourself. Do not allow the key of the specie-room out of your possession, nor leave it lying about your cabin. Always make a point of putting valuable parcels or articles away in the strong room *at once*, without any delay, on receiving them. Always obtain a clean receipt for any packages before letting them leave the specie-room. It is your only safeguard. Far better keep the packet and have it examined than deliver it on anything but a perfectly clean receipt.

Avoid receiving specie or valuable packets when other work or cargo is likely to interfere or distract attention.

Never allow anyone to enter the specie-room, especially if small parcels are lying about, unless you are there yourself.

Questions relating to the gold robbery which occurred at sea on board the P. & O. steamer " OCEANA," during one of its voyages from Australia to London, came before the Court of Appeal.

The Queensland National Bank (Limited) shipped ten boxes, each containing 5,000 sovereigns, on board the " OCEANA " at Port Jackson, for Lloyd's Bank, in London. During the voyage thieves got into the bullion-room, broke open one of the chests, and stole the money. An action was brought by the Queensland Bank against the P. & O. Company to recover damages for breach of duty, whereby the £5,000 was lost. On the pleadings a preliminary question of law was raised—whether the Bill of Lading implied a warranty that the specie-room on board ship was so constructed as to be reasonably fit to resist thieves. This point Mr. Justice Mathew decided in favour of the Bank, and the P. & O. Company appealed. Lords Justices Smith, Chitty, and Collins upheld that decision, and dismissed the appeal.

Gold, fine, 1,228 lbs. equal 1 cubic foot.
Standard gold, 1,180 lbs. equal 1 cubic foot.

APPROXIMATE VALUE OF FOREIGN MONIES IN BRITISH CURRENCY, 1913.

G. indicates Gold ; **S.** indicates Silver ; **P.** indicates that Paper is the *Standard Currency*.

(Nominal) **G.** ARGENTINE REPUBLIC.—1 Gold Peso = 4s. 0d.
(Actual) **P.** „ „ 1 Peso = 100 Centavos = 1s. 9d. (fluctuates).

G. AUSTRALIA.—Same as Great Britain.

G. AUSTRIA-HUNGARY.—1 Krone = 100 Heller = 10d.
G. BELGIUM.—*See* LATIN CONVENTION.
(Nominal) G. BRAZIL.—1 Gold Milreis = 2s. 3d.
(Actual) P. „ 1 Milreis = 1,000 Reis = 1s. 4¼d. (fluctuates).
G. CANADA.—1 Dollar = 100 Cents = 4s. 1⅓d.
(Nominal) G. CHILI.—1 Gold Peso = 1s. 6d.
(Actual) P. „ 1 Peso = 100 Centavos = 10d. (fluctuates).
S. CHINA.—1 Silver Yuan or Dollar = 100 Cents = 2s. 0d. (about).
G. DENMARK.—1 Krone = 100 Ore = 1s. 1½d.
S. EAST INDIES.—1 Rupee = 16 Annas = 1s. 4d.
ECUADOR.—1 Silver Sucré = 100 Centavos = 2s. 0d.
G. EGYPT.—£E of 100 Piastres = £1 0s. 3¾d.
G. FRANCE.—*See* LATIN CONVENTION.
G. GERMAN EMPIRE.—1 Mark = 11¾d.
(Nominal) G. GREECE.—Drachma = 100 Lepta = 9½d.
G. HOLLAND.—1 Florin or Guilder = 100 cents = 1s. 8d.
G. ITALY.—*See* LATIN CONVENTION.
G. JAPAN.—1 Gold Yen = 100 Sen = 2s. 0½d.
G. LATIN CONVENTION.—1 Franc = 100 Cents = 9½d. to 9¾d.; about 25 Francs to the £.
Nom. G., Act. S. MEXICO.—1 Dollar = 100 Centavos = 2s. 0½d.
G. NORWAY.—*Same as* DENMARK.
G. PERU.—1 Libra = 10 Soles; 1 Sole = 100 Centavos = 2s. 0d.
(Nominal) G. PORTUGAL.—1 Gold Milreis = 4s. 5¼d.
(Actual) P. „ 1 Milreis = 1,000 Reis = 3s. 10d. (about).
ROUMANIA.—*See* LATIN CONVENTION.
G. RUSSIA.—1 Gold Rouble = 100 Kopecks = 2s. 1⅓d.
(Nominal) S. SPAIN.—1 Silver Peseta = 9·513d.
(Actual) P. 1 Paper Peseta = 8½d. (about).
G. SWEDEN.—*Same as* DENMARK.
G. TURKEY.—1 Turkish Gold £ = 100 Piastres = 18s. 0d.; 1 Piastre = 40 Paras.
G. UNITED STATES OF AMERICA.—1 Dollar = 100 Cents = 4s. 1·3d. $4·86 to the £.
(Nominal) G. URUGUAY.—1 Gold Peso = 4s. 3d.
(Actual) S. „ 1 Silver Peso = 100 Centesionos = 4s. 2d. (about).

INTEREST TABLE.

Without an elaborate series of tables it is impossible to show the amount of Interest due upon any given sum at 2½, 3, 5, or any other rate per cent., but for ordinary purposes it may be easily calculated by a very simple process.

At 5 per cent. per annum the amount of interest upon one pound for every month is one penny; having ascertained what this amounts to, other rates may be reckoned by adding to or dividing it.

2½ per cent. is one-half.
3 per cent. is six-tenths.
3½ per cent. is seven-tenths.
4 per cent. is four-fifths.

Thus, 5 per cent. upon £60 for 10 months would be £2 10s.; at 2½ per cent. £1 5s.; at 3 per cent., £1 10s.; at 3½ per cent., £1 15s.; at 4 per cent., £2. If the rate of Interest be more than 5 per cent., then the addition must be made. Thus, to reckon at 6½ per cent., add one-fourth; for 7½ per cent., add one-half. Bankers and money-dealers calculate the Interest for every day, and they have volumes of tables constructed specially for the purpose, the Five per Cent. Tables alone extending to nearly 400 pages.

GONGS.—Packed in cases, to Europe, measuring 4 to 6 feet, weights and value various and uncertain.

GRAIN.—Vessel carrying heavy cargoes should have one-third of the weight in the between decks, or above the beams. When bulk grain fills the lower holds, shifting boards and properly constructed feeders are necessary, and are required by the Board of Trade.

Vessels carrying more than one-third of their net register tonnage are considered as ships laden with Grain Cargo. American grain is usually shipped through elevators. A single elevator will load 2,500 tons in 24 hours. When grain has to be bagged the empty bags are generally filled in the hold from the elevator shoots, sewn up securely and stowed in their places.

Vessels will carry, on an average,

Of **Grain**, about 7 quarters to one net register ton;
Of **Wheat**, about 56 bushels to one net register ton;
Of **Corn**, about 60 bushels to one net register ton;

or in other words, steamers will carry about eight times, and sailing ships about seven times, their net register tonnage, in quarters of 480 lbs. Grain in bulk will stow about 10 per cent. closer than if stowed in bags. Bags of grain should never be cut open (or bled) when stowing in the holds; serious loss often falls on the shipowner

by stevedores doing so without first obtaining permission in writing, and noting it on the receipts and Bills of Lading. When ships are not responsible for torn or burst bags, this should be inserted in the receipts. There shall not be carried between the decks, or, if the ship has more than two decks, between the main and upper decks, any grain in bulk, except such as may be necessary for feeding the cargo in the hold in properly-constructed feeders. Grain cargoes should have at all times ample ventilation.

CARRAIGE OF GRAIN.

COPY OF NOTICE ISSUED BY THE BOARD OF TRADE, AUGUST 1913.

FOREIGN-GOING SHIPS.

The owners and masters of vessels engaged in the foreign trade and loading grain cargoes at foreign ports, other than those in the Mediterranean and Black Sea, or on the coast of North America, are informed that in an inquiry held recently into the loss of a vessel laden with wheat, chiefly in bulk, at a French port in the Bay of Biscay, it was found that the precautions taken to prevent the grain cargo from shifting were not sufficient.

Although the precise cause of the loss of the vessel could not be determined, yet, in view of the heavy weather she encountered, the shifting of the cargo and the consequent capsizing of the vessel were considered by the Court to be the probable causes of the disaster.

The law requires, in the case of vessels laden with grain cargoes, that all necessary and reasonable precautions must be taken in order to prevent the grain cargo from shifting; and, if these precautions have not been taken, the master of the ship and any agent of the owner who was charged with the loading of the ship or the sending of her to sea, are each liable to a fine not exceeding three hundred pounds, and the owner of the ship is also liable to the same fine, unless he shows that he took all reasonable means to enforce the observance of the requirements, and was not privy to the breach thereof.

The Board of Trade are not prepared to advise in general terms as to what precautions shall be taken in the case of vessels loading grain at foreign ports, other than Mediterranean, Black Sea, or North American ports for which special requirements are laid down in Sections 453 and 454 of the Merchant Shipping Act, 1894.

Owners and masters of such vessels are however hereby warned not to assume that the absence of such regulations affords any warrant for neglecting to take all necessary and reasonable precautions, and the responsibility for taking such precautions is placed by the law on the owners, and their agents, and on the masters of the vessels referred to.

Marine Department, Board of Trade.

GRAIN, Standard Weight:—

Wheat	....60 lbs.	per bushel,	37½	bushels	= 2,240 lbs.	(1 ton).
Corn	.....56 ,,	,,	,,	40	,,	,,
Rye	.....56 ,,	,,	,,	40	,,	,,

Barley	....48 lbs.	per bushel,	46⅝	bushels	= 2,240 lbs.	(1 ton).
Oats	.....32 ,,	,,	,,	70	,,	,,
Buckwheat	45 ,,	,,	,,	50	,,	,,
Clover	.....63 ,,	,,	,,	55⅓	,,	,,
Beans	.....63½	,,	,,	35¼	,,	,,
Linseed	..50 ,,	,,	,,	44⅔	,,	,,

20 cwt. of Wheat, in bags, should stow in 52 feet.
20 cwt. of Wheat, in bulk, should stow in 48 feet on an average.
20 cwt. of Corn or Maize, in bags, should stow in 52 feet; heavier sorts 49 feet.
20 cwt. of Rye, in bags, should stow in 53 feet.
20 cwt. of Barley, in bags, should stow in 60 feet.
20 cwt. of Oats, in bags, should stow in 75 to 80 feet.
20 cwt. of Beans or Peas, in bags, should stow in 46 to 47 feet.
20 cwt. of Buckwheat, in bags, should stow in 65 feet.
20 cwt. of Maize, in bulk, should stow in 50 feet.

CARRIAGE OF GRAIN.

COPIED FROM THE MEMORANDUM RELATING TO THE CARRIAGE OF GRAIN, ISSUED BY THE BOARD OF TRADE IN 1907 AND REPRINTED 1913.

The law relating to the carriage of grain in ships is contained in Sections 452 to 456 of the Merchant Shipping Act, 1894, and in Sections 3 and 11 of the Merchant Shipping Act, 1906. (*See* Appendix A.)

Whenever a grain cargo is laden on board any British ship all necessary and reasonable precautions must be taken to prevent the grain cargo from shifting.

Special requirements are laid down in Sections 453 and 454 of the Merchant Shipping Act, 1894, for British ships loading grain at ports in the Mediterranean and Black Sea and on the coast of North America, it being required by Section 453 that these vessels must be loaded in accordance with either:—

(1) The Eighteenth Schedule to the Merchant Shipping Act, 1894. (*See* Appendix A.) Or,
(2) Regulations for the time being approved by the Board of Trade. (*See* Appendix B.) Or,
(3) The vessel must be constructed and loaded in accordance with a plan for that particular vessel approved by the Board of Trade.

The conditions under which plans of loading are approved are indicated in Appendix C.

The provisions of the Merchant Shipping Act, 1894, respectine the carriage of grain in British ships, are, to a limited extent, applied to Foreign ships loading, or arriving with, grain in the United Kingdom, by Section 3 of the Merchant Shipping Act, 1906. (*See* Appendix A.) Under this section:—

(1) Foreign ships loading grain in the United Kingdom must comply with Section 452 of the Merchant Shipping Act, 1894, while they are within a port in the United Kingdom.

(2) Foreign ships arriving in the United Kingdom with grain must in every case comply with Section 452, and ships arriving with grain laden at any port in the Mediterranean, Black Sea, or on the coast of North America must comply with Section 453. Masters of these vessels must also deliver the Notice required by Section 454 to the proper Officer of Customs at their port of arrival in the United Kingdom.

(3) Foreign ships loading or discharging grain at any port in the United Kingdom may be inspected, as regards their grain cargo, by Surveyors of the Board of Trade, while they are within a port in the United Kingdom.

APPENDIX A.

Merchant Shipping Act, 1894.

SECTIONS 452 TO 456.

Carriage of Grain.

452.—(1.) Where a grain cargo is laden on board any British ship all necessary and reasonable precautions (whether mentioned in this Part of this Act or not) shall be taken in order to prevent the grain cargo from shifting.

(2.) If those precautions have not been taken in the case of any British ship, the master of the ship and any agent of the owner who was charged with the loading of the ship or the sending of her to sea, shall each be liable to a fine not exceeding three hundred pounds, and the owner of the ship shall also be liable to the same fine, unless he shows that he took all reasonable means to enforce the observance of this section, and was not privy to the breach thereof.

453.—(1.) Where a British ship laden with a grain cargo at any port in the Mediterranean or Black Sea is bound to ports outside the Straits of Gibraltar, or where a British ship is laden with a grain cargo on the coast of North America, the precautions to prevent the grain cargo from shifting, set out in the Eighteenth Schedule to this Act, shall be adopted, unless the ship is loaded in accordance with regulations for the time being approved by the Board of Trade, or is constructed and loaded in accordance with any plan approved by the Board of Trade.

(2.) If this section is not complied with in the case of any ship, reasonable precautions to prevent the grain cargo of that ship from shifting shall be deemed not to have been taken, and the owner and master of the ship and any agent charged with loading her or sending her to sea shall be liable accordingly to a fine under this Part of this Act.

(3.) Nothing in this section shall exempt a person from any liability, civil or criminal, to which he would otherwise be subject for failing to adopt any reasonable precautions which, although not mentioned in this section, are reasonably required to prevent grain cargo from shifting.

454.—(1.) Before a British ship laden with grain cargo at any port in the Mediterranean or Black Sea and bound to ports outside the Straits of Gibraltar, or laden with grain cargo on the coast of North America, leaves her final port of loading, or within forty-eight hours after leaving that port, the master shall deliver or cause to be delivered to the British consular officer, or, if the port is in a British possession, to the chief officer of Customs at that port, a notice stating—

(*a.*) the draught of water and clear side, as defined by this Part of this Act, of the said ship after the loading of her cargo has been completed at the said final port of loading; and

(*b.*) the following particulars in respect to the grain cargo; namely,

(i.) the kind of grain and the quantity thereof, which quantity may be stated in cubic feet, or in quarters, or bushels, or in tons weight; and

(ii.) the mode in which the grain cargo is stowed; and

(iii.) the precautions taken against shifting.

(2.) The master shall also deliver a similar notice to the proper officer of Customs in the United Kingdom, together with the report required to be made by the Customs Consolidation Act, 1876, on the arrival of the ship in the United Kingdom.

(3.) Every such notice shall be sent to the Board of Trade, as soon as practicable, by the officer receiving the same.

(4.) If the master fails to deliver any notice required by this section, or if in any such notice he wilfully makes a false statement or wilfully omits a material particular, he shall for each offence be liable to a fine not exceeding one hundred pounds.

(5.) The Board of Trade may, by notice published in the London Gazette, or in such other way as the Board think expedient, exempt ships laden at any particular port or any class of those ships from this section.

455.—For securing the observance of the provisions of this Part of this Act with respect to grain cargo, any officer having authority in that behalf from the Board of Trade, either general or special, shall have power to inspect any grain cargo, and the mode in which the same is stowed, and for that purpose shall have all the powers of a Board of Trade Inspector under this Act.

456.—For the purpose of the provisions of this Part of this Act with respect to grain cargo—

The expression "grain" means any corn, rice, paddy, pulse, seeds, nuts, or nut kernels.

The expression "ship laden with a grain cargo" means a ship carrying a cargo of which the portion consisting of grain is more than one-third of the registered tonnage of the ship, and that third shall be computed, where the grain is reckoned in measures of capacity, at the rate of one hundred cubic feet for each ton of registered tonnage, and where the grain is reckoned in measures of weight, at the rate of two tons weight for each ton of registered tonnage.

Merchant Shipping Act, 1894.

EIGHTEENTH SCHEDULE.

Precautions as to Grain Cargo.

(1.) There shall not be carried between the decks, or, if the ship has more than two decks, between the main and upper decks, any grain in bulk, except such as may be necessary for feeding the cargo in the hold, and is carried in properly constructed feeders.

(2.) Where grain (except such as may be carried in properly constructed feeders) is carried in bulk in any hold or compartment, and proper provision for filling up the same by feeders is not made, not less than one-fourth of the grain carried in the hold or compartment (as the case may be) shall be in bags supported on suitable platforms laid upon the grain in bulk: Provided that this regulation with respect to bags shall not apply—

(*a.*) To oats, or cotton seed; nor

(*b.*) To a ship which is a sailing ship of less than four hundred tons registered tonnage, and is not engaged in the Atlantic trade; nor

(*c.*) To a ship laden at a port in the Mediterranean or Black Sea if the ship is divided into compartments which are formed by substantial transverse partitions, and are fitted with longitudinal bulkheads or such shifting boards as hereinafter mentioned, and if the ship does not carry more than one-fourth of the grain cargo, and not more

than one thousand five hundred quarters in any one compartment, bin, or division, and provided that each division of the lower hold is fitted with properly constructed feeders from the between decks; nor

(*d.*) To a ship in which the grain cargo does not exceed one-half of the whole cargo of the ship, and the rest of the cargo consists of cotton, wool, flax, barrels or sacks of flour, or other suitable cargo so stowed as to prevent the grain in any compartment, bin, or division from shifting.

(3.) Where grain is carried in the hold or between the decks, whether in bags or bulk, the hold or the space between the decks shall be divided by a longitudinal bulkhead or by sufficient shifting boards which extend from deck to deck or from the deck to the keelson and are properly secured, and if the grain is in bulk are fitted grain-tight with proper fillings between the beams.

(4.) In loading, the grain shall be properly stowed, trimmed, and secured.

Merchant Shipping Act, 1906.

SECTIONS 3 AND 11.

3.—(1) After the first day of October one thousand nine hundred and seven, sections four hundred and fifty-two and four hundred and fifty-five of the principal Act shall apply to a foreign ship which loads a grain cargo in the United Kingdom so long as the ship is within a port in the United Kingdom.

(2) If, after the first day of October one thousand nine hundred and seven, a foreign ship laden with grain cargo arrives at any port in the United Kingdom having the grain cargo so loaded that the master of the ship, if the ship were a British ship, would be liable to a penalty under the provisions of Part V. of the principal Act relating to the carriage of grain, the master of that foreign ship shall be liable to a fine not exceeding three hundred pounds.

(3) After the first day of October one thousand nine hundred and seven, section four hundred and fifty-five of the principal Act shall apply to a foreign ship laden with grain which discharges all or any part of her cargo at any port in the United Kingdom so long as the ship is within a port in the United Kingdom.

(4) The provisions of section four hundred and fifty-four of the principal Act, so far as that section provides for the delivery of the notice mentioned therein to the proper officer of Customs in the United Kingdom, shall apply to all foreign ships laden with grain cargo arriving at a port in the United Kingdom after the date aforesaid, and the master of the ship shall be liable accordingly.

11. Any offence for which a person is liable to a fine under subsection (2) of section four hundred and fifty-two of the principal Act (which relates to the obligation to take precautions to prevent grain cargo from shifting) or under any provision of this Act which relates to the lading of grain cargoes on foreign ships may be prosecuted summarily; but the fine to which a person is liable for any such offence shall not, if the offence is prosecuted summarily, exceed a hundred pounds.

APPENDIX B.

REGULATIONS APPROVED BY THE BOARD OF TRADE.

(1.) Rules of the Board of Underwriters of New York.
(2.) Rules of the National Board of Marine Underwriters of New York.
(3.) Rules of the New Orleans Board of Underwriters.
(4.) Rules of the Mobile Board of Underwriters.
(5.) Rules adopted by the Wheat Tariff Association, San Francisco, Wheat Cargoes one-third in bulk.

(6.) Regulations adopted by the Wheat Tariff Association, San Francisco, for Grain Cargoes in bags.
(7.) Rules and Byelaws of the Port Warden of Montreal.
(8.) Mediterranean and Black Sea. Regulations approved by the Board of Trade.

(1.) THE BOARD OF UNDERWRITERS OF NEW YORK.

(Marine.)

RULES for LOADING GRAIN in BAGS or BULK.

VESSELS loading grain in bags or bulk on voyages from ports of the United States to ports of Europe will be required to conform to the following rules adopted by The Board of Underwriters of New York, to enable the Surveyor to issue a proper certificate.

Owners and masters of vessels intending to load grain are particularly requested to give early notice to the Surveyors, when ready for fitting, and also when ready to receive grain.

Vessels loaded in conformity to the Rules may have a certificate to that effect from the Surveyor appointed by The Board of Underwriters of New York, and the respective Insurance Companies composing the said Board will be duly notified thereof.

GENERAL REGULATIONS.

1. The draft of water, or free-board, to be regulated by a scale approved by the Loading Committee. Free-board shall be measured from top of deck at side of the vessel to the water's edge at the centre of the load water-line; vessels having free-boards assigned by the rules of the Board of Trade (Marine Department), London, shall not be loaded deeper than permitted by those rules.

2. Shifting boards must extend from the upper deck to the keelson when grain is carried in bulk. When grain is carried in bags the shifting boards must extend from deck to deck in the between decks, and not less than four feet downwards from the beams in the lower hold.

3. Shifting boards referred to in all Rules shall be of two (2) inch yellow pine or of three (3) inch spruce (or equivalent).

4. All hatch feeders and end bulkheads must be boarded on the inside.

5. The grain must be well trimmed up between the beams and in the wings, and the space between them completely filled.

6. No grain shall be carried in the fore and after peaks except in bags.

7. No coal shall be carried on deck of steamers sailing between the 1st of October and the 1st of April beyond such a supply as will be consumed prior to vessels reaching the ocean.

8. Care must be taken that when grain in bags or other cargo is stowed over bulk grain the bulk grain must be covered with two thicknesses of boards placed athwartships and fore and aft, with spaces between the lower boards of not more than four (4) feet, and between the upper boards of not more than nine (9) inches. Care must be taken that all the bags are properly stowed, in good order, and well filled and that the tiers are laid close.

SAILING VESSELS.

9. Vessels being loaded with grain in bags shall be dunnaged from six to twelve inches on the floor and from six to fifteen inches on the bilges, according to the form of the ship's bottom; and two (2) inches at the sides.

The between decks shall be dunnaged two (2) inches from the sides and decks.

The dunnage in the hold must be laid over with boards and entirely covered with sails, or approved mats, so as to prevent any of the loose grain from

running down on to the floor of the vessel and thence to the pump-well. If sails are used they must be of good quality and free from holes. The sails and mats must cover the keelsons.

10. Bulk or loose grain must be taken in bins prepared for that purpose. Materials for bins must be of well-seasoned stock; unseasoned lumber must not be used where it will come in contact with the grain.

11. The floor of the bin must be laid on sleepers of scantling 2½ by 4 inches in size, sixteen inches apart from centre to centre, supported by studs of corresponding size, also sixteen inches from centre to centre.

It must be raised from six to twelve inches over the floor of the vessel—in the bilge from six to fifteen inches, and in vessels that are very flat or sharp, may be increased or diminished at the discretion of the Surveyor.

In no case shall the floor of the bin be laid on loose dunnage.

The floor is considered as extending from the keelson to the turn of the bilge. It must be laid with two thicknesses of one-inch boards, so that they will break joints at the edges and ends, and care must be taken that it be grain-tight. Vessels under three hundred (300) tons register may be permitted to have a single floor laid with one-inch boards placed edge and edge and seams covered with battens two by one (2 x 1) inch, or edges lapped one inch.

12. The studs for the forward and after bulkheads for vessels not exceeding fourteen (14) feet depth of hold must be equal to four by six (4 x 6) inches in size; for vessels of a greater depth than fourteen (14) feet, they must be equal to four by eight (4 x 8) inches. They must be set twenty (20) inches apart from centre to centre, firmly secured at the top and bottom, and properly braced, in the centre, also cleated on the ceiling to resist the pressure of the grain and made grain-tight.

13. All air strakes and open seams must be closed and the sides of the vessel above the turn of the bilge must be sealed after the manner of clapboarding reversed, and not furred where it can be avoided. When furring is used the ceiling must be made grain-tight at the bilges and sides. All lodging and bosom knees not fitted tight to the deck must be cleated grain-tight around the face of the knees.

14. Vessels with single deck or with one deck and beams carrying a full cargo of grain are required to have, in addition to the forward and after end bulkheads, two trimming bulkheads (thus making a division of three compartments), to extend from the upper deck to within two feet from the bottom of the vessel; except where the between decks are laid aft, the after one may extend only to the lower deck, and be so placed that in loading the middle compartment will be entirely filled and the end ones left to trim the vessel. If the end compartments are not entirely filled care must be taken that the cargo be properly covered and secured on top to prevent shifting. The studs of the trimming bulkheads to be not less than three by six (3 x 6) inches and set twenty-two (22) inches from the centres, and all studs to be firmly secured at top and bottom and properly braced and cleated.

15. Vessels carrying bulk and bags must not carry bulk higher than to admit of the stowage of one quarter of the cargo in bags or not less than five heights or bags over it (except the vessel be under five hundred (500) tons register when the height may be regulated by the Surveyor).

16. Vessels with two decks having bulk grain in hold as high as the between deck shall have strakes of between deck-plank opened on each side over the bulk in the wings and amidships, and have three or four feet of bulk grain in wing and amidship feeders, upon which sufficient grain in bags or other cargo may be stored over board coverings, as provided for in Rule 8. When the hold is not filled with bulk grain to the between deck, enough space must be left and sufficient cargo stowed over it to properly secure it, as provided for in Rule 8.

17. The pump-well must be sufficiently large to admit of the passage of a man to the bottom of the hold, and with room to work conveniently when there, say not less than four (4) feet fore and aft, and five (5) feet athwartships (reference, however, must be had to the size of the keelson and assistant keelsons), and must be grain-tight and ceiled.

18. Access to the pump-well must be had either by a man-hole through the upper deck or by a clear passage-way between decks from the after hatch. In no case must it be from the main hatch.

19. Masts, water-tanks, and pumps, either of wood or iron, must be properly cased, to prevent damage from leakage, and mast coats must be strong and tight.

20. The between deck hatches must be kept off, and the scuppers safely plugged to prevent loose grain from running down the ship's timbers.

Iron or Steel Sailing Vessels.

21. The foregoing rules are also to apply to iron or steel sailing vessels, excepting that in cases where the floor and ceiling are in such good condition as to warrant it, the extra floor and ceiling may be dispensed with, and if the stanchions are not over four (4) feet apart and are double, two or three inch plank can be fitted between them for shifting plank.

Vessels having iron or steel between decks without openings for wing feeders, the bulk grain in the lower hold must be secured by at least five heights of bags or its equivalent in other cargo laid over board coverings as provided in Rule 8.

Steamers.

22. Steamers having water ballast tanks must have them covered with a grain-tight platform made of 2½ or 3 inch sound and dry planks, but this platform may be dispensed with where the top of the tanks are of heavy plates and precautions are taken against overflow from the bilges.

23. Steamships without ballast tanks, having a cargo platform, in good order, will not be required to fit a grain floor over it, otherwise such grain floor will be required.

24. Vessels carrying small quantities of grain in bulk must have shifting boards to the top of the grain, and the bulk must be properly covered with boards before any other cargo is stowed over it.

25. Single deck steamers with a continuous hold forward will be required to have a closed bulkhead to divide the same. This rule will also apply to the after hold.

26. Shifting planks must extend from deck to floor where grain is carried in bulk and be properly secured to stanchions, or shored every eight feet of length and every five feet of depth of hold, including hatchways. Shores to be three by eight (3 x 8) inches or four by six (4 x 6) inches.

27. No bulk grain (or seeds in bulk, except oats, as hereinafter provided in Rules 35, 36, and 37) to be carried in between decks, nor, where a ship has more than two decks, between the two upper decks, unless in properly constructed feeders to fill the orlop and lower hold. Bulk grain may be carried on orlop or third deck below, provided said orlop has wing openings and amidship feeders to feed same. All amidship feeders to have properly constructed shifting boards to top of coamings.

28. Steamers with two or more decks not having sufficient and properly constructed wing and 'midship feeders will be required to leave sufficient space above the bulk in lower hold, not less than 5½ feet, to properly secure it with bags or other cargo; the bulk to be covered with boards as in Rule 8. If an orlop deck has sufficient openings to the lower hold the orlop and lower hold may be considered as one hold and loaded accordingly.

29. Steamers having one deck and beams may carry bulk to such a height as will permit the stowage over it of not less than five tiers of bags, except in

the extreme ends where four tiers of bags may be sufficient. All bags to be stowed on two tiers of boards as provided for in Rule 8.

Single deck Steamers with high hatch coamings loading full or part cargoes of Grain in bulk—

1st. The coamings of the hatch or hatches of the hold which is to be filled with bulk grain must be at least three (3) feet six (6) inches in height;

2nd. The hatchways must be of sufficient size to admit of not less than four (4) per cent. of the total grain in the hold being stowed within the coamings;

3rd. The hatchways must be properly supported by heavy iron cross beams and fitted with fore and aft shifting boards; and

4th. The hatchways must be so placed that they are capable of feeding the centre and both ends of the hold.

30. Steamers with laid between decks must have hatchway feeders, and if the distance in the lower holds, between the forward bulkhead in said holds and the nearest end of the hatchway feeders, exceeds twelve (12) feet, then vessel must have a wing feeder on each side provided in the between decks to feed this space. If there are no openings in the between decks for wing feeders five heights of bags must be put on top of the bulk grain from the bulkhead to within twelve (12) feet of the feeders.

The same rule applies when the distance between the after end of the hatchway feeders and the after bulkhead in lower holds exceeds twelve (12) feet.

31. Bags stowed or laid between decks must be dunnaged.

32. Steamers carrying grain in poop or under bridge deck must have such grain in bags and have proper dunnage and shifting boards.

33. Steamers of the type known as "Turret," with single deck or single deck and beams, may load full cargoes of grain in bulk, but must have shifting boards as required in Rules 2 and 3, and if required by Surveyors, trimming bulkheads forward and aft extending from deck to floor, or if coming under hatches to top of coaming as directed by the Surveyors, and substantially fitted under their supervision. The loose grain in the end compartments to be secured by not less than four tiers of bags on boards properly laid.

34. Steamers that are partly single deck and partly double deck, known as "switchback" and as "part awning deck" steamers, may load all bulk grain in the lower holds of their double deck compartments, providing proper midship feeders and wing feeders are fitted, but the space in the between decks around the feeders must be filled with bagged grain or general cargo, but if the vessel is too deep to carry any grain or other cargo on the between decks the feeders are to be shored or properly secured to the satisfaction of the Surveyor.

If there are no openings in between decks for wing feeders and the bulkheads are more than twelve (12) feet away from the nearest end of the midship feeders, five (5) heights of bags must be put on top of the bulk grain from the bulkheads to within twelve (12) feet of the feeders.

All hatchways used as feeders to have properly constructed shifting boards to the top of the coamings.

35. *Full Cargo Oats.*—Steamers with double bottoms for water ballast may carry a full cargo of oats in bulk; but if with two or more decks must have tight wing and hatch feeders to feed the lower holds and/or orlop as provided in Rule 30.

36. *Part Cargo of Oats.*—When the quantity of oats carried in bulk between the two upper decks exceeds 60 per cent. of the capacity of said deck, the excess over 50 per cent. may be stowed in bulk in compartments fitted with wing shifting boards extending from bulkheads at each end of hold to within four (4) feet of the hatches, one of such compartments shall be the largest between deck compartments; *or* Where a steamer has four or more compartments in between decks oats may be loaded in bulk in all of these compartments if they are provided with wing feeders of increased size to reach from the forward and after bulkhead to within four feet of hatches. The hatch feeders or feeders for lower hold must be capped boxed feeders, five or six feet in depth. All holds are to be so fitted.

37. In single deck steamers oats in bulk may be loaded over heavy grain with proper separation in two compartments, but the grain in all other compartments must be properly secured with bagged grain or other cargo easily handled. This Rule applies also to steamers where some compartments are double and some single deck.

38. If owing to unusual construction of vessels which may necessitate deviation from the foregoing Rules, the Surveyor must obtain the approval of the Loading Committee of the Board.

New York, September 1, 1899.

(2.) RULES of the NATIONAL BOARD of MARINE UNDERWRITERS, of NEW YORK.

[The rules of the National Board of Marine Underwriters, New York, are similar to the rules of the Board of Underwriters of New York.]

(3.) REGULATIONS of the BOARD of UNDERWRITERS of NEW ORLEANS, for PREPARATION and STOWAGE of GRAIN-LOADED VESSELS.

STEAMERS:

1. Steamers, with or without water ballast tanks, must have floors planked with 2½ or 3 inch planks (the same being sound, dry and grain-tight), and not less than 18 inches above cementing.

2. Steamers with a continuous hold forward will require a close bulkhead in the same, and also aft if deemed necessary by the Surveyor.

3. Two (2) to three (3) inch shifting planks, or equivalent, at the discretion of the Surveyor, must be properly secured to stanchions and shored every 8 feet of length, and every 5 feet of depth of hold; shores to be 3 by 8 or 4 by 6, at the discretion of the Surveyor.

4. The shifting boards must extend from upper deck to keelson where grain is carried in bulk, with secure beam fillings; when grain is carried in bags the shifting boards must extend from deck to deck in the 'tween decks and not less than 4 feet downward from the beams in the lower holds.

5. No bulk grain to be carried in the between decks or (where a ship has more than two decks) between the two upper decks, unless in properly constructed feeders to feed the hold; feeders amidships to have centre shifting boards.

6. All grain carried in bulk must be supplied by proper feeders or sufficient space left to properly secure it with bags of grain or other cargo.

7. Steamers not having properly constructed feeders will be required to leave sufficient space above the bulk, not less than 5½ feet, to properly secure it with bags or other cargo; the bulk to be boarded.

8. Steamers having one deck and beams may carry bulk to such a height as will permit the stowage over it of not less than five heights of bags stowed over boards laid fore and aft (excepting at the extreme ends, where four heights will be sufficient), and so placed that each bottom bag shall be supported by two boards with athwartship bearing boards sufficient to prevent the bags from settling into the bulk grain.

9. The grain must be well trimmed up between the beams and wings and the space between the beams and wings completely filled.

10. The class of steamers known as " switchback " or " web-frame " are allowed to carry all bulk grain in No. 2 hold only. The feeding hatch must have shifting planks as high as the hatch covers.

11. Steamers which have long bridge decks, same being double deck at Nos. 2 and/or 3 holds, may carry all bulk grain in said holds, only same must be fitted with properly constructed feeders with shifting boards extending up to the top of hatch covers. No bulk grain will be allowed outside the feeders and between the decks.

12. Bunker hatches within any hold in which they are fitted are to be utilised for feeders when possible. A bulkhead is required between Nos. 1 and 2 holds.

13. Oats may be shipped in bulk in steamers fitted for grain, excepting that feeders will not be required, but they must be well trodden down to the satisfaction of the surveyor while being loaded, or space left for at least five heights of bags.

14. Flax seed is to be shipped in the same manner as wheat, excepting that the boards covering the bulk seed shall be placed close together.

PART CARGOES.

15. Vessels loading *part* cargoes of grain will conform to above rules, except where there is seven feet or more height between grain in lower holds and decks above, and said grain secured by cotton screwed in over one tier placed on it flat, in which case no platform of boards will be required between grain and cotton.

Dated New Orleans, November 13, 1896.

(4.) MOBILE BOARD OF UNDERWRITERS.

REGULATIONS for PREPARATION and STOWAGE of GRAIN-LOADED VESSELS.

The only differences in these rules to those of the Board of Underwriters of New Orleans are contained in rule 10 and Part Cargoes.

10. The class of steamers known as " switchback " or " web-frame " are allowed to carry all bulk grain in No. 2 hold only. The feeding hatch must have shifting planks as high as the hatch covers.

Steamers which have long bridge decks, same being double deck at Nos. 2 and/or 3 holds, may carry all bulk grain in said holds, only same must be fitted with properly constructed feeders with shifting boards extending up to the top of hatch covers. No bulk grain will be allowed outside the feeders and between the decks.

Bunker hatches in No. hold are to be utilised for feeders when possible.

A bulkhead is required between Nos. 1 and 2 holds.

PART CARGOES.

Vessels loading part cargoes of grain will conform to above rules except where there is 7 feet or more height between grain in lower holds and decks above and said grain secured by cotton screwed in over one tier placed on it flat, in which case no platform of boards will be required between grain and cotton.

(5.) RULES adopted by the WHEAT TARIFF ASSOCIATION, SAN FRANCISCO, for loading IRON or STEEL SHIPS with one-third of CARGO of WHEAT in bulk from PACIFIC COAST to EUROPE.

1. The pump-well must be sufficiently large to admit of the passage of a man to the bottom of the hood and have room to work conveniently there, and must be grain-tight and cased if required.

Access to the pump-well must be either by a manhole through the upper deck or by a clear passage-way between decks from the after hatch ; in no case must it be from the main hatch.

2. Bulk or loose grain must be taken in bins prepared for that purpose. Material for bins must be of well-seasoned spruce or pine stock. Unseasoned lumber must not be used where it will come in contact with the grain.

3. The floor of bin must be laid on sleepers of scantling 3 by 4 inches in size, 16 inches apart from centre to centre, supported by studs in the bilges of corresponding size, also 16 inches from centre to centre. It should be raised 6 inches over the floor of the vessel ; in the bilge, 9 inches.

All defects in the ceiling of the ship must be made good before the floors of the bin are laid, and care must be taken that the casing round the iron keelson be made grain-tight.

The sides of the vessel above the turn of the bilge must be ceiled after the manner of clapboarding, so as to shed grain, and the boards must be lapped not less than 2 inches and securely nailed with steel wire nails.

In no case should the floor of the bin be laid on loose dunnage. The floor is considered as extending from the keelson to the turn of the bilge. It must be laid with two thicknesses of one-inch boards, so that they will break joints at the edges and ends, and care must be taken that it be perfectly tight.

The bins to be lined with burlaps or sails to the height of the bulk grain.

4. The studs for the forward and after bulkheads must be equal to 4 by 8 inches. They must be set 20 inches apart from centre to centre, firmly secured at the top and bottom, and properly braced and cleated on the ceiling to resist the pressure of the grain.

5. Shifting boards 2 inches thick must extend from the keelson to the deck on each side of the stanchions, fitted tight to the beams, with battens over the seams, and care must be taken that the stanchions are well secured at both ends and not more than 7 feet apart.

Two thicknesses of 1-inch board may be substituted for the 2-inch boards, provided they are fixed to break joints at the edges and ends.

Shifting boards to be shored off to sides of ship in wake of hatches.

Wooden stanchions of same thickness as the iron stanchions, to be put in and driven tight from beams to keelson, to which the shifting boards are to be secured.

Exceptions may be made in cases where permanent shifting planks are satisfactorily fitted.

6. Masts and water tanks, either of wood or iron, must be properly cased to prevent damage from leakage. Mast coats must be strong and tight.

7. Vessels being loaded with over 12,000 bushels (360 short tons) of grain in bulk must have intermediate athwartships partitions or bulkheads.

8. Vessels carrying bulk and bags should not carry the bulk higher than to admit of the stowage of not less than 6 heights of bags over it, stowed as customary, on a platform of 1-inch boards, not more than 6 inches apart, supported on and nailed to 1-inch boards not more than 5 feet apart, so as to prevent the bags from settling into the bulk grain.

Each bottom bag to be so placed that it shall be supported by two boards running crosswise to the bags.

Two tiers of bags to be stowed from the bottom of the bins to the top of the bulk wheat, around the masts, pump-well and tank.

9. No double deck vessel is permitted to carry bulk grain in the between decks.

November, 1896.

(6.) REGULATIONS ADOPTED by the WHEAT TARIFF ASSOCIATION, SAN FRANCISCO, for the LOADING of CARGOES of GRAIN in BAGS at PACIFIC COAST PORTS.

IRON SHIPS.

Dunnage in the bottom to be not less than 6 inches on the floor and 10 inches at the bilge. Lower hold to be lined with boards from the keelson to the lower deck beams.

The sides of the 'tween decks, if fore and aft battened only, the space between the battens to be filled in with boards.

Where vertical battens are fitted over the fore and aft ones, thick mats may be used in lieu of the boards before mentioned, but in the absence of mats, additional vertical battens are to be fitted between the original ones.

Where the 'tween deck is laid and caulked, with coamings fitted round hatchways, the deck to be dunnaged with strip and board two inches high; but where the deck is open the gutter waterway only will require to be covered with a fore and aft board.

In all cases where a vessel has carried salt or other cargo which leaves a permanent dampness in the deck, it is to be dunnaged in the same manner as a laid deck.

Sufficient covering to be laid over the bottom as high as the upper turn of the bilge, all fore and aft, to prevent the loose grain getting to the pumps.

Shifting boards 2 inches thick, placed on each side of the stanchions, abreast of each other, must extend from deck to deck in the 'tween decks, and must extend not less than 4 feet downward from the beams in the lower hold, and be secured to the satisfaction of the Surveyors.

In vessels where no manhole is fitted to get to the pumps, a proper communication is to be left through the cargo to get access to the pump-well.

November, 1896.

(7.) EXTRACT from the REVISED RULES and REGULATIONS of the OFFICE of the PORT WARDEN of the HARBOUR of MONTREAL sanctioned by the Council of the Montreal Board of Trade, March, 1898.

REGULATIONS AFFECTING VESSELS OUTWARDS.

The master of any vessel intending to load grain for any port not within the limits of inland navigation shall notify the Port Warden who shall ascertain whether such vessel is in a fit state and condition to receive and carry her cargo in safety to its destination, and if in his opinion she is unfit he shall declare what repairs are necessary. While the different holds are being prepared the master shall notify the Port Warden from time to time, who shall see that each hold is in a fit and proper state and condition to receive grain and shall enter in the books of his office all particulars connected with these surveys and grant necessary certificates.

Limbers.—The limber boards to be lifted and limbers and water courses to the ship's pumps to be cleaned where necessary.

Ceiling.—The seams of ceiling over water ballast tanks will require to be made grain-tight by nailing ½ x 2 inch battens over them.

Flooring.—Steamships without ballast tanks having a cargo platform 18 inches or higher above the cement in the bottom will not be required to fit a grain floor over it, otherwise such grain floor will be required, but in all cases the cement between the frames above the ceiling must be examined and repaired if necessary, pump and other casings where passing through the ship's ceiling to be made grain-tight. When there is not the necessary depth of floor a grain flooring will be required extending from the keelson to the turn of the bilge of 3 x 4 inch scantling close boarded edge to edge with two 1-inch boards breaking joints and made grain-tight.

In vessels having water ballast tanks in No. 2 and 3 holds, the Port Warden in his discretion may grant a certificate and permit bulk grain to be loaded in No. 1 and No. 4 holds, provided that on examination the ship's ceiling in these holds is found to be dry and in good order, the seams caulked and made grain-tight.

The Port Warden may also at his discretion in the case of vessels of modern construction with specially heavy ballast tank tops without wooden ceiling, grant certificates to load bulk grain provided the bilges and water courses in the wings are sufficiently deep.

Shifting Boards.—Shifting boards must extend from the upper deck to the keelson when grain is carried in bulk: when grain is carried in bags the shifting boards must extend from deck to deck in the 'tween decks and not less than 4 feet downwards from the beams in the lower holds.

Shifting boards to be built of 2 or 3 inch planks laid close on edge properly secured to the hold pillars or shored every 8 feet of length and 5 feet of height of hold: the shores or braces to be 3 x 6 inches or 4 x 6 inches according to length and firmly secured at both ends in the hatchways, the shores not to be further apart than 5 feet of length of hatch. Filling pieces to be fitted between the beams where bulk grain is carried. Shifting boards to be fitted in the between decks when grain or flour in bags is carried. A bulkhead is to be built if the forward hold is continuous between No. 1 and No. 2 hatches.

Feeders.—Grain carried in bulk must be supplied by proper feeders or else secured by bags of grain or other cargo.

Feeders to be constructed of 3 x 6 inch studding fitted inside of hatch coamings if possible, cleated at head and foot, boarded with 1½ inch boards. On the inside of studding, shifting boards in centre to extend above bulk grain and shored from side of feeders or hatch coamings, between deck scuttles to be used as supplementary feeders when practicable, the size of the box to be regulated by the Port Warden. Bunker hatches to be utilised as feeders when feasible. The quantity of bulk grain in the feeders must be at least 3 per cent. of the quantity of the contents of the hold they feed.

The Port Warden may also at his discretion permit vessels that have specially constructed high hatch coamings the capacity of which is not less than 3 per cent. of the contents of the hold or bin, to use said hatch coamings as grain feeders, but such permission shall not be given before the first day of May or after the first day of October.

Stowage.—Steamers having one deck and beams may carry bulk grain to such a height as will permit the stowage over it of four heights of bagged grain, and where bagged grain or other cargo is used for securing the bulk grain boards of 1 inch thickness must be laid close edge to edge on athwartship bearers not more than 4 feet apart on the bulk grain to prevent it shifting. The bulk grain must be well trimmed up between the beams and in the wings and all spaces completely filled.

There shall not be carried between the decks, or if the ship has more than two decks between the main and upper decks, any heavy grain in bulk except such as may be necessary for feeding the cargo in the hold and is carried in properly constructed feeders.

No vessel over 400 tons register shall be permitted to load an entire cargo of grain in bulk, oats excepted. Oats may be carried in bulk to any extent irrespective of the tonnage of the ship, but subject to such regulations with reference to dunnage lining and shifting boards as the Port Warden may prescribe.

The master shall inform the Port Warden of the quantity of bunker coal his vessel may require to take in after leaving this port, so that due allowance may be made when the freeboard is given. The freeboard of all vessels to be regulated by the Port Warden but the freeboard is never to be less than that assigned under the provisions of the Imperial Merchant Shipping Act, 1894.

April, 1903.

(8.) MEDITERRANEAN AND BLACK SEA. REGULATIONS APPROVED BY THE BOARD OF TRADE.

WHEREAS it is provided by section 453 of the Merchant Shipping Act, 1894, that "Where a British ship laden with a grain cargo at any port in the Mediterranean or Black Sea is bound to ports outside the Straits of Gibraltar, or where a British ship is laden with a grain cargo on the coast of North America, the precautions to prevent the grain cargo from shifting set out in

the Eighteenth Schedule to this Act shall be adopted, unless the ship is loaded in accordance with regulations for the time being approved by the Board of Trade."

Now therefore, the Board of Trade approve the following regulations, viz. :—

1. In the case of single-decked ships loading a grain cargo at a port in the Mediterranean or Black Sea, where no provision is made for feeding the hold, and where, according to the requirements of the Eighteenth Schedule of the said Act, one-fourth of the grain carried in any one compartment, bin, or division must be in bags, the Board of Trade have approved a regulation that the whole fourth, or any part of the fourth, of the compartment, bin, or division which would, according to the requirements aforesaid, be stowed with grain in bags, may in lieu thereof be stowed with bales of cotton, bales of grass, or bags of flour, or other suitable cargo ; provided always that the substituted cargo be supported on suitable platforms laid on the grain in bulk and be so stowed as to prevent the grain from shifting.

2. In the case of ships having two decks, oats, cotton seed, or barley may be carried in bulk in the 'tween decks, provided that—

(*a*) Grain-tight feeders be fitted from the lower hold through the hatches to the uppermost deck : such feeders to contain not more than 6 per cent. and not less than 3 per cent. of the quantity carried in the hold or compartment they feed. These feeders must not interfere with or decrease in any way the 2 per cent. which is required to feed the grain carried in the 'tween decks.

Or (in lieu of the regulation contained in the paragraph (*a*) above) may be substituted the following :—

(*b*) That the between deck hatches shall not at any time be put on ; and

(*c*) That strakes of the deck be lifted, or if the deck is an iron deck, sufficient openings be made through the deck in the wings, which with the open hatches shall admit of the cargo in the between decks feeding the lower hold.

The regulations contained below shall also be observed whether the ship is loaded under the regulation contained in paragraph (*a*) above, or in accordance with the regulations contained in paragraphs (*b*) and (*c*) above ; that is to say,

(*d*) There shall be longitudinal grain-tight shifting boards in accordance with Clause 3 of the Eighteenth Schedule of the said Act, and the grain shall be properly stowed, trimmed, and secured, as required by Clause 4 of the said Schedule.

(*e*) Feeders shall be fitted to feed the grain carried in the between decks, such feeders to contain not less than 2 per cent. of the compartments they feed. If strakes of the deck be lifted, or sufficient openings are left to enable the grain in the 'tween decks to feed the lower hold, then it is obvious that the feeders must contain at least 2 per cent. of the compartments they feed, *i.e.*, the 'tween decks, plus the lower hold.

(*f*) The space in the 'tween decks in which the grain in bulk is carried shall be bounded at each end by grain-tight transverse bulkheads or partitions extending from deck to deck.

(*g*) The ship shall not be overloaded.

3. If at any time it should appear to the Board of Trade that the above regulations or any of them insufficiently provide for the safety of the ship, and should therefore in their opinion be revoked and withdrawn ; or that they need alteration ; the Board of Trade will revoke, withdraw, or alter them accordingly.

April, 1897.

APPENDIX C.

Instructions Relating to Plans of Loading for Vessels Loading Grain at Ports in the Mediterranean and Black Sea.

Applications for Exemption.

1. All applications which may be received from owners or builders for exemption, under Sec. 453 of the Merchant Shipping Act, 1894, from certain of the provisions of the Eighteenth Schedule, and subsequent reports thereon, should be forwarded direct, together with the accompanying drawings in duplicate and the Surveyor's report, to the Principal Ship Surveyor, for the consideration of the Grain Committee. The duplicate drawing for the master's use should in all cases be forwarded to the Grain Committee so that it may be stamped for identification. Surveyors should, before forwarding the drawings showing the proposed arrangements for the stowage of grain, be careful to see that the information embodied upon them as regards shifting boards, feeders, bins for bulk grain, etc., is complete and definite, so that in the event of an approved plan of loading being issued, the master's drawing itself, independent of the printed plan of loading, would form a definite and reliable guide to the master in loading the vessel.

2. In all cases the owners' intentions with regard to the stowage of grain in the deck erections should be clearly indicated on the drawing, and all spaces that are intended to be stowed with bagged grain should be clearly so marked. This will save subsequent inconvenience, for if the drawing bears a note that no grain will be carried above the upper deck and it afterwards appears that the owner desires to carry grain there, the plan of loading will have to be withdrawn and an amended one issued.

Surveyors should, as opportunity arises, point out verbally to builders that the carriage of grain above deck is not objected to in vessels of ordinary proportions, on the following conditions :—

(*a*) Grain all in bags, provided shifting boards are fitted.

(*b*) Barley, oats or cotton seed, in bulk, if shifting boards are fitted grain-tight, and efficient feeders provided.

(*c*) In single-decked vessels of ordinary proportions, grain of any description, other than barley, oats or cotton seed, in bulk, not exceeding one-sixth of the total cargo carried below deck, provided the shifting boards are fitted grain-tight and the bulk grain is carried in bins with proper feeders. The bins should not be of greater capacity than that specified in clause 17.

3. The drawings received from builders are frequently " sun-prints," on a material which is not sufficiently durable. While Surveyors cannot refuse to accept such sun-prints, they should point out to builders or owners that tracings on tracing cloth or linen-backed sun-prints are more suitable for the use of the master. It is preferred that the drawings should be on a scale of one-eighth of an inch to the foot, as a scale of one-sixteenth of an inch to the foot is too small to show clearly the necessary details.

4. The builders should in all cases (unless the vessel is close ceiled) add a note to the drawings that the figures denote the capacities of the holds, etc., as measured out to the skin plating and to the top of the beams.

5. In the case of single-deck vessels a note must be added as to shifting boards to the same effect as clause 2 of the printed form A (*see* Appendix D), and it must clearly show that when bulk grain is carried the shifting boards are to extend, grain-tight, in the hatchways and trunk feeders (if any), up to the under side of the hatches or fore and afters. Notes must also be added to the same effect as clauses 3 and 4 of the form A. In the case of vessels having a 'tween decks for the whole or part of the length, the notes should follow the clauses 3, 4, 5 and 6 of form B, or clauses 2, 3 and 4 of form C. In

addition a note should be added to the following effect in the case of vessels (*e.g.*, two decked or part awning decked) in which a limited amount of bulk grain is allowed to be carried in the 'tween decks in bins :—

" NOTE.—The cubic contents of the bins which are marked for bulk grain " in the 'tween decks on this drawing

" are { not greater than / equal to } { one-sixth / one-seventh / one-eighth } of the whole space

" available for grain { below the upper deck / forward of the engine room } and

" when all compartments of the hold and 'tween decks are filled with grain " all the bins marked for bulk grain may contain grain in bulk. When, how- " ever, one of the holds or some of the bins for bagged grain in the 'tween " decks are left empty, the master should not fill all the bins which are marked " for bulk grain with heavy grain in bulk, but he should either leave some " of them empty or reduce their size or take other steps to insure that the " *total weight of heavy bulk grain carried in the 'tween decks shall not*

" *exceed* { *one-sixth* / *one-seventh* / *one-eighth* } *of the entire cargo carried* { *below the upper deck.* / *forward of the engine room.* }

" When the cargo is partly grain and partly cargo of other descriptions, " the proportion stated above should be computed on the entire weight of " the cargo carried below deck, including goods of all descriptions."

The Surveyor should point out that, as these notes are intended for the guidance of the master in loading the vessel, they should be *printed* upon the drawings in conspicuous letters.

In vessels of ordinary proportions the maximum proportion of heavy bulk grain that may be carried in the 'tween decks will usually be one-sixth in two-decked vessels, one-seventh in well-decked vessels, and one-eighth in partial awning decked vessels, but the proportion may be reduced in certain cases.

6. When it is intended that bulk grain is to be carried, either in a complete 'tween decks or in a bridge house or poop, a plan view of the 'tween decks or of the deck beneath the bridge house or poop should be given on the drawings, showing all hatchways to the holds beneath, including trimming hatches (if any), and a note should be added that all hatches, except within the trunk feeders, are to be closed when bulk grain is carried, with an asterisk at the hatchways referred to.

7. When one end of a hold is partitioned off by a bulkhead with the intention that the part divided off is to be fed from the hold by means of doorways or openings in the bulkhead, the openings must be in sufficient number and of sufficient width, say not less than four, having a combined width of not less than 24 per cent. of the vessel's registered breadth, and they must extend right up to the underside of the deck beams. A sectional view showing the bulkhead and the openings should appear on the drawings with a note :— " The doorways in the bulkhead to be left open, otherwise not less than one- " fourth of the grain carried in No. hold is to be in bags supported on " suitable platforms laid upon the grain in bulk."

8. The Surveyors should request the builders or owners to mark on all drawings the depth of the beams at the ends of the hatchways. If the depth of the hatch end beams or coamings exceeds 15 inches, special means must be adopted to allow the grain to pass from the feeder to the holds.

9. In the case of vessels having a tier of hold beams these should be indicated on the drawings, which should also bear a note to the effect that in the event of a wood deck being laid on the beams the approved plan of loading will cease to apply and should be returned for cancellation.

10. The position of all portable fittings such as trunk feeders, and the portable bulkheads forming the ends of the bins or compartments for bulk grain, should be plainly and definitely shown on the drawing by figured dimensions.

11. Surveyors should pay special attention to reserve bunkers. If there is no intention of carrying grain in such spaces the drawings should be plainly so marked ; if on the other hand the owner proposes to carry grain in a reserve bunker, the shifting boards and feeders must comply with the usual conditions of approved plans of loading.

12. When a plan is submitted for the carriage of light grain all in bulk in a two deck vessel, as an alternative to a plan for carrying heavy bulk grain in bins, the total capacity of each hatchway which forms a feeder to the light grain should be clearly shown on the drawings, as well as the capacity of that portion of the hatchway which is available for feeding the bins for heavy grain.

13. Feeders to bulk grain in 'tween deck spaces are sometimes arranged so as to be over a recess instead of over the main body of the bin. Such an arrangement should be avoided whenever possible, and when it occurs in several bins in the same vessel the feeding arrangements cannot be considered satisfactory.

14. When a feeder is partially closed at the bottom, its effective capacity must be considered as equivalent to the amount of grain which would be able to flow out of it, in the event of the settlement of grain in the compartment to be fed.

15. In the case of vessels having a 'tween decks, when it is proposed to form the feeders to the lower holds by deep portable hatch coamings, instead of the more usual trunk feeders, the Surveyor should report in detail what provision is made for securing the portable plates to the permanent lower deck hatch coamings, and a note must be added to the drawing under each hatchway so fitted, " Deep portable coamings to be in place when bulk grain is carried."

16. Surveyors should note that it is considered necessary that not only a minimum feeder capacity should be provided, but also that the feeders should be suitably arranged as far as possible to feed the different parts of the holds or compartments. It is desirable that no part of a hold or compartment should be at a greater distance than from 20 to 24 feet from the nearest feeder, but in vessels having a small ratio of depth to breadth a somewhat greater distance has in some cases not been objected to.

17. The maximum capacity to be allowed for the bins for bulk grain in the 'tween decks of two-decked vessels is to be regulated as follows :—

If the feeders to any of the bins are so arranged that the distance between the bounding bulkheads of the bins and their respective feeders does not exceed 14 feet, when measured on a fore and aft line, the capacity of such bins may be 560 quarters. If, however, the above distance, in the case of any of the bins, is over 14 feet, but not exceeding 18 feet, the capacity of such bins should not exceed 470 quarters. If the distance referred to exceeds 18 feet in the case of any of the bins, such bins should not have a greater capacity than 375 quarters.

18. When permanent iron or steel grain divisions are fitted which are not in themselves grain tight between the vessel's beams, it is not considered satisfactory that wood beam fillings should be merely jammed between the beams without other means of securing them, as the master will be liable to assume that, as the iron division is permanent, the responsibility does not rest with him of seeing that the beam fillings are in place before each voyage. It is therefore desirable that, when wood beam fillings are necessary in such cases, they should be permanently secured in place by a bolt at each end of the wood filling. In all cases of iron divisions the Surveyor should report (*a*) whether the iron division is made grain tight round the beams without the use of wood, (*b*) if not, whether the wood fillings have been efficiently bolted

in place. In such cases a large scale sketch should be shown on the drawings indicating clearly the beam fillings and the bolts for securing them in place.

19. With reference to clause 2 of Regulations No. 8 (*vide* Appendix B) regarding the carriage of oats, barley, or cotton seed, all in bulk, in vessels of the two-decked type, Surveyors should note that the Board have decided that a uniform minimum feeder capacity of 2 per cent. may be accepted for all plans of loading provided the disposition of the feeders is such as properly to feed the different parts of the holds or compartments.

20. With regard to clause 3 of the form B, and to clause 2 of the form C (*vide* Appendix D), it is to be understood that the conditions stated are intended to apply to a cargo partly or entirely of heavy grain. The conditions which govern the carriage of oats, barley, and cotton seed in vessels having two decks are contained in regulations approved by the Board under section 453 of the Merchant Shipping Act, 1894 (*vide* Appendix B, Regulations No. 8, clause 2), and light grain may be carried in bulk in the 'tween decks under these regulations without reference to an approved plan of loading. When, however, it is desired to carry heavy grain in bulk in the 'tween decks equal to one-sixth of the whole cargo below deck, and to fill the remainder of the 'tween deck space with light grain in bulk, the aggregate capacity of the bins for heavy bulk grain must not be one-sixth of the whole space for grain below deck, but must be reduced so that the *weight* of heavy bulk grain in the 'tween decks does not exceed one-sixth the *weight* of the entire cargo carried below deck, including goods of all descriptions.

Surveyors' Reports.

21. The registered dimensions of the vessel should, in all cases, be reported, and if a plan of loading has been approved for a sister vessel the name and official number should be stated.

22. Surveyors should carefully ascertain and report whether all the particulars set forth on the drawings are in order, whether the dimensions of the hatchways, as marked, represent the mean internal dimensions of the feeders and correspond with their own measurements at the ship; or, if it is not practicable to take such measurements, they should report whether the dimensions on the drawings correspond with the measurements of the hatchways as taken when computing the vessel's tonnage. The heights of all feeders should be measured from the under side of the deck to the under side of the hatch covers.

23. Surveyors are in all cases to report whether the feeder or feeders to each hold or compartment in which bulk grain is to be carried have a capacity at least 2 per cent. of the respective compartments. The feeder capacities should be their actual capacities after deductions have been made for all obstructions. When the feeders are trunked in a 'tween decks, bridge house or poop, the height of those spaces from beam to beam in vicinity of the feeders is to be marked upon the drawings.

24. The figures marked on drawings representing the capacities of holds or compartments, in which it is intended to stow bulk grain, should in all cases represent the actual space which the bulk grain would fill if carefully stowed. Thus in iron and steel vessels of ordinary construction, the measurements should be taken right out to the skin of the vessel, and up to the under side of the wood or steel deck.

It is not considered necessary, in ordinary cases, that Surveyors should personally measure the capacity of the lower holds in order to verify the figures on the drawings, unless they have some reason to doubt their correctness; it is, however, desirable that occasional check measurements should be taken of one of the holds.

In the case of vessels having a 'tween decks for the whole or part of their length the mean breadth and mean height of at least one of the bins amidships should be measured, and the Surveyor should satisfy himself that the capacity of the bin marked on the drawings agrees with his measurements, and should report accordingly.

25. In the case of two deck vessels, when it is intended to carry heavy bulk grain in the 'tween decks, a report is to be forwarded that the aggregate capacity of the bins set apart for heavy bulk grain does not exceed one-sixth of the vessel's total capacity for grain below the upper deck. A similar report is required when it is proposed to carry heavy bulk grain in bins in a bridge house or poop, and also in the case of part awning deck vessels and well-decked vessels. The capacity of the bins should, as a rule, be limited to one-eighth of the whole space for grain forward of the engine room in the case of part awning deck vessels, and to one-seventh of that space in the case of well-deck vessels.

26. If the builder or owner is unwilling to fit the portable wooden shifting boards, bins and feeders, etc., in place at the time of the Surveyor's inspection, his report need not on that account be withheld, but he should check at the ship the depth of all such portable trunk feeders, which is usually determined by the height in 'tween decks plus depth of upper deck hatchways, and should satisfy himself that when the portable fittings in question are in place, as indicated by figured dimensions on the drawing, the provisions of the printed "plan of loading" will be complied with, and report accordingly. When the drawing, however, indicates that iron and steel bulkheads or trunks are to be fitted, and such permanent fittings are found neither to be fitted in place, nor to be on board and capable of being erected by the ship's company, the Surveyor should call attention to the matter in his report.

27. In the case of vessels having a 'tween decks for the whole or part of their length, when determining the maximum aggregate capacity to be allowed for the bins in such 'tween decks, para. 3 of the form marked B should be held to mean that the heavy grain carried in bulk in the bins, exclusive of that carried in the trunk feeders for feeding the lower holds, may be one-sixth of the entire cargo carried under deck, and similarly in the case of para. 2 of the form marked C.

28. In the event of a vessel being at sea or otherwise inaccessible when an application for exemption from bagging is received, the Surveyor's report need not as a rule be delayed until the vessel's arrival. In such cases the report regarding the capacity of the feeders, as required by clause 21, and regarding the capacity of the bins, as required by clauses 22 and 23, may be based on the measurements which appear on the tonnage formula, which in such cases should be obtained from the Principal Surveyor for Tonnage, unless the Surveyor is already in possession of the details of the measurements. The Grain Committee will then be in a position to decide whether it is necessary for the vessel to be visited by a Surveyor before the plan of loading can be approved.

29. Surveyors should be careful to call attention in their reports to any fittings or arrangements of an unusual character. In the case of shifting boards and their beam fillings especially, attention should be directed to any fittings which appear less strong or less efficient than usual.

APPENDIX D.

SKELETON FORMS OF APPROVED PLANS OF LOADING.

Form A.—Single Deck Vessel.

1. The feeders to the holds (and also to the compartments of the bridge house and poop) are to contain not less than two per cent. of the compartments which they feed. The feeders to the holds Nos. are to be trunked up to the bridge (or poop) deck as shown on the drawing.

2. A steel grain-tight bulkhead or shifting boards of sufficient strength are to extend for the entire length of the hold or compartment in which grain is carried, and vertically from the keelson to the deck (and from the main deck to the bridge deck and poop deck). Shifting boards are also to be fitted in the hatchways and trunk feeders up to the bottom of the hatch fore and afters. These shifting boards, when grain is carried in bulk, are to be fitted grain-tight with grain-tight fillings between the beams. (Shifting boards are also to be fitted in the bridge house and poop when bagged grain is carried in these spaces.) The steel longitudinal bulkhead is to be made grain-tight by fitting a wood in each beam space in the manner shown by a detail sketch on the attached drawing.

3. No grain (whether in bags or) in bulk, to be carried above the upper deck except in the feeders (except oats, cotton seed or barley, which may be carried in bulk in the bridge house and poop).

4. When the bulk grain stowed in one or more of the compartments is not sufficient to entirely fill the compartment and its feeder, not less than one-fourth of the grain carried in such compartments is to be in bags supported on suitable platforms laid upon the grain in bulk. The cargo is to be carefully trimmed and so loaded as to give the ship sufficient stability. The vessel is not to be overladen.

5. The doorways in the wooden bulkhead at the end of No. hold are to be left open, otherwise not less than one-fourth of the grain carried in No. hold is to be in bags supported on suitable platforms laid upon the grain in bulk.

6. In the event of a lower deck being laid upon a tier of hold beams, the conditions of exemption from bagging will cease to apply, and this approved plan of loading should be returned for cancellation.

7. Any grain or other cargo which may be carried in any deck erection, which has been exempted from measurement for tonnage, will be chargeable with dues on the space so occupied in accordance with the provisions of Section 85 of the Merchant Shipping Act, 1894.

8. This plan is approved only when the vessel is loading grain in the Mediterranean or Black Sea ports, and on the distinct understanding that a copy of this plan of loading, together with the accompanying drawing, will at all times be kept on board the vessel.

9. The Board of Trade reserve to themselves power to withdraw this approval at any time.

Form B.—Two Deck Vessel.

1. The feeders to the 'tween decks are to contain not less than two per cent. of the entire compartments which they feed.

2. The feeders to the lower holds are to be trunked in the 'tween decks, and are to contain not less than two per cent. of the compartments which they feed.

3. All grain, except barley, oats and cotton seed, carried in the 'tween decks, exceeding in weight one-sixth of the entire cargo carried below deck, is to be in bags, and the heavy bulk grain is to be carried in bins arranged as shown by the figured dimensions on the accompanying drawing with proper arrangements for feeding them. The capacity of the bins may be reduced if desired, but in no case is the capacity of any bin for bulk grain to be larger than shown on the drawing.

4. A steel grain-tight bulkhead or shifting boards of sufficient strength are to extend longitudinally for the entire length of the hold or compartment in which grain is carried, and vertically from the keelson to the deck, and from the 'tween decks to the upper deck. Shifting boards are also to be fitted in the hatchways and trunk feeders up to the bottom of the hatch fore and afters. These shifting boards, when grain is carried in bulk, are to be fitted grain-tight, with grain-tight fillings between the beams. (Shifting boards are also to be fitted in the bridge house and poop when bag grain is carried in these spaces.) The steel longitudinal bulkhead is to be made grain-tight by fitting a wood in each beam space in the manner shown by a detail sketch on the attached drawing.

5. No grain (whether in bags or) in bulk, to be carried above the upper deck, except in the feeders.

6. When the bulk grain stowed in one or more of the bins or compartments is not sufficient to entirely fill the compartment and its feeder, not less than one-fourth of the grain carried in such bins or compartments is to be in bags supported on suitable platforms laid upon the grain in bulk. The cargo is to be carefully trimmed and so loaded as to give the ship sufficient stability. The vessel is not to be overladen.

7. Any grain or other cargo which may be carried in any deck erection, which has been exempted from measurement for tonnage, will be chargeable with dues on the space so occupied in accordance with the provisions of Section 85 of the Merchant Shipping Act, 1894.

8. This plan of loading is approved only when the vessel is loading grain in the Mediterranean or Black Sea ports, and on the distinct understanding that a copy thereof, together with the accompanying drawing, will at all times be kept on board the vessel.

9. The Board of Trade reserve to themselves power to withdraw this approval at any time.

Form C.—Partial Awning Deck Vessel or Well Deck Vessel.

1. The feeders to all the lower holds and to the 'tween decks (forward) (at front of bridge house) are to contain not less than two per cent. of the entire compartments which they feed, and the feeders to the lower holds Nos. are to be trunked in the 'tween decks as shown on the drawing.

2. All grain, except barley, oats, and cotton seed, carried in the 'tween decks, exceeding in weight one-eighth of the entire cargo carried forward of the engine room, is to be in bags, and the heavy bulk grain is to be carried in bins arranged as shown by the figured dimensions on the accompanying drawing with proper arrangements for feeding them. The capacity of the bins may be reduced if desired, but in no case is the capacity of any bin for bulk grain to be larger than shown on the drawing.

3. A steel grain-tight bulkhead or shifting boards of sufficient strength are to extend longitudinally for the entire length of the hold or compartment in which grain is carried, and vertically from the keelson to the deck (and from the 'tween decks to the (upper) bridge deck). Shifting boards are also to be fitted in the hatchways and trunk feeders up to the bottom of the hatch fore and afters. These shifting boards, when grain is carried in bulk, are to be fitted grain-tight, with grain-tight fillings between the beams. The steel longitudinal bulkhead is to be made grain-tight by fitting a wood in each beam space in the manner shown by a detail sketch on the attached drawing.

4. When the bulk grain stowed in one or more of the bins or compartments is not sufficient to entirely fill the compartment and its feeder, not less than one-fourth of the grain carried in such bins or compartments is to be in bags supported on suitable platforms laid upon the grain in bulk. The cargo is to be carefully trimmed and so loaded as to give the ship sufficient stability. The vessel is not to be overladen.

5. In the event of a lower deck being laid upon a tier of hold beams, the conditions of exemption from bagging will cease to apply, and this approved plan of loading should be returned for cancellation.

6. Any grain or other cargo which may be carried in any deck erection, which has been exempted from measurement for tonnage, will be chargeable

with dues on the space so occupied in accordance with the provisions of Section 85 of the Merchant Shipping Act, 1894.

7. This plan of loading is approved only when the vessel is loading grain in the Mediterranean or Black Sea ports, and on the distinct understanding that a copy thereof, together with the accompanying drawing, will at all times be kept on board the vessel.

8. The Board of Trade reserve to themselves power to withdraw this approval at any time.

N.B.—The words contained in brackets on the above forms are alternative, and such of them as do not apply to the particular case are to be deleted.

AUSTRALIA.

Vessels loading Grain in Australian ports have to comply with the various Marine Underwriters' Associations.

The following are the Rules of The Marine Underwriters' Association of Victoria.

SAILERS.

Grain (which means wheat, barley, oats, peas and cargo of a like nature), whether full or part cargoes, to be dunnaged as follows :—

Iron vessels, six (6) inches in floor, and nine (9) inches in bilges, the upper surface to be flat wood laid not more than six (6) inches apart, so as to form a fairly flat floor, and covered with old sails or burlap above the turn of the bilge. Vertical dunnage at the sides to be one (1) inch in thickness, and spaced not more than twelve (12) inches. Double shifting boards of not less than two (2) inches thickness, deals or planks, placed abreast of each other and securely lashed to each stanchion, not more than six (6) inches apart ; said boards to extend from foremast to mizzenmast, or, in the case of a four-masted vessel, to the jiggermast ; in the 'tween decks from deck to deck, and in the lower hold to six (6) feet from below the beams. In vessels having a less depth of lower hold than twelve (12) feet, the shifting boards shall be placed to one half of the depth of the lower hold. Ventilators where necessary, etc. On no consideration must the stanchions under the beams be removed. No cargo to be taken in until the Association's Surveyor has inspected the limbers and the dunnage in floor and bilges, and the burlap or sails thereon have been passed by him.

All grain must be shipped in bags. The bags must not be cut or the grain started in stowing or loading cargo.

The use of hooks is absolutely prohibited.

STEAMERS.

Steamers with ballast tanks to have not less than one (1) inch dunnage on the ceiling, continued up over the turn of the bilge on the tank tops. This dunnage may, however, on the authority of the Association's Surveyor, be dispensed with if the ceiling or platform is of a character suitable for the cargo to be carried.

Steamers without ballast tanks to have not less than six (6) inches dunnage on the floor, and not less than nine (9) inches in the bilge.

On laid 'tween decks not less than two (2) inches dunnage for bales or bags, and not less than one (1) inch for cases and other wooden packages ; also not less than one (1) inch vertical side dunnage. The fore and aft battens are not to be reckoned as dunnage.

All grain (which means wheat, barley, oats, peas, and cargo of a like nature), flour, compressed fodder, hay, bran and the like, to be subject to the foregoing dunnage regulations and exemptions, whether part or full cargo, and to have such shifting boards as may be required by the Association's Surveyor. Steamers without 'tween decks to have, when the construction permits, shifting boards fitted alternately from main deck beams to 6 feet down. Burlap or sails to be laid over dunnage in floor and bilges. Mats may be used in place of burlap or sails if approved by the Association's Surveyor. No cargo to be taken in until the Association's Surveyor has inspected the limbers and the dunnage in floor and bilges, and the burlap, sails or mats thereon have been passed by him.

All grain must be shipped in bags. The bags must *not* be cut, or the grain started in stowing or loading cargo.

The use of hooks is absolutely prohibited.

TURRET AND TRUNK STEAMERS LOADING FULL CARGOES OF GRAIN AND/OR FLOUR.

Alternate shifting boards to be fitted at each side of the hatchway from line of harbour deck to 'tween decks ; and on mid-ship or wing stanchions between the hatchways ; where there are no 'tween decks alternate shifting boards to be fitted 6 feet down on each side of the hatchways from line of harbour deck. No coal or other cargo to be carried on the Turret or Harbour decks.

April 4, 1910.

GRAM.—An Indian grain. 20 cwt. in bags stow in about 50 cubic feet.

GRANITE.—In cases, 20 cwt. should stow in 19 feet. 20 cwt. of dressed granite in block stow in 16 feet.

GRASS SEEDS.—Dutch and Continental clover and other seeds usually in bags ; American in casks or bags. They are susceptible to damage by water. The grains are generally hard, glassy, and very liable to run from the packages. In sacks $2\frac{1}{2}$ to $3\frac{1}{2}$ cwt.

20 cwt. stow in 49 feet. (*See* **Clover Seed.**)

Timothy.—A fine grass seed, usually imported from Holland or America, is small and requires strong and tight packages. It produces a fine small grass.

20 cwt. in bags stow in 60 feet to 110 feet, and according to quality.

Trefoil.—A description of clover seed. It is distinguished from clover by its larger size and yellower colour.

20 cwt. should stow in 56 feet.

Other descriptions of grass seed, in bags, 20 cwt. stow in from 70 to 90 feet.

GREASE.—In stowing such oleaginous cargo care should be taken to keep it away from any goods liable to be damaged. Avoid stowing it in the centre of the vessel, as it will damage by heat.

(*See* **Lard, Tallow.**)

A hogshead of American grease weighs 1,318 lbs., and measures 37 ft. 1 in.

A tierce weighs 420 lbs., and measures 11 ft. 7 ins.

A barrel weighs 370 lbs., and measures 10 ft. 8 ins.

A pail weighs 32 to 38 lbs., and measures 1 ft. 2 ins.

Tierces of beef fat weigh from 385 to 419 lbs., and measure from 10 ft. 8 ins. to 11 ft. 7 ins. each.

One ton of 20 cwt., or 2,240 lbs., stows in about 65 feet.

GRINDSTONES.—In cases 20 cwt. should stow in about 57 feet. (Uncertain.)

GROUND NUTS.—A kind of nut much used in commerce. When shelled and dry they may be stowed among other goods. In collecting an Indian cargo together for a vessel, owners try to get a large proportion of shelled ground nuts. It is considered not only choice cargo, but such as will give the best results in stowing with a certain proportion of weight. This article, especially if new or stowed near moist articles, will heat and damage by sweat.

In bags 20 cwt. of shelled ground nuts stow in 58 feet.

GUANO.—The best guano is the excrement of sea-birds, dead seals, birds, fish, etc., accumulating in certain dry climates for centuries past. Good samples will be found to contain 85 per cent. of lime phosphates; the remainder ammonia, chloride of potassium, sodium, water, and sand.

"Stevens on Stowage" says that guano cargoes injure the iron-work of a ship. The Boston *Commercial* points out that several first-class ships between three and six years old have required extensive repairs. Not only have their ceilings and planking been decayed, but many of their timbers also, particularly their cants, while the keelson and first futtocks have generally been sound. A few were planked with yellow pine, which in some instances was not affected, though the timbers were decayed, whilst in others the rot penetrated both pine and oak. As nearly all these ships were built under inspection they were considered good for ten years at least. As all had carried guano shortly after they were built it has been assumed that guano affects new timber injuriously.

Guano is injured by contact with salt, nitrate of soda, etc., and it injures almost every article of human consumption, on account of the large proportion of ammonia which it contains; it will turn nuts, feather, etc., almost black. Vessels often require dunnage; they must carefully avoid stowing general goods in the same hold, particularly delicate articles such as tea, coffee, chocolate, etc.

20 cwt. of guano stow in about 42 feet.

GUM.—An exudation obtained from numerous plants. The name is applied to several classes of substances distinct from each other, both chemically and physically. True gum is soluble in water, in which condition it becomes a strongly adhesive mucilage. Stow in a cool part and keep clear of damp and oily articles as much as possible, especially on long voyages in hot climates. Shipped in chests of 100 to 300 lbs. each.

20 cwt. stow in about 50 feet. (Uncertain.) (*See* **Dammar.**)

GUNCOTTON.—(Wet) Dimensions of boxes 24 ins. by 11 ins. by 8½ ins., net weight of explosive 25 lbs., gross weight of package about 52 lbs. (*See* **Explosives.**)

GUNJA.—A drug or preparation from the hemp plant, extensively used as a narcotic in the East; the raw material is also smoked, mixed with tobacco leaf. Shipped in bundles, but only in small quantities. There is a duty on Gunja, when manufactured, similar to that levied on opium. (*See* **Hemp.**)

GUNNIES.—The manufacture and export of gunnies from India has largely increased of late years. Each bale contains about 250 bags, pressed by powerful hydraulic machinery and bound with iron bands. Shipped to all parts of the world. Have no objectionable qualities and can be stowed where required. The measurement of three bales of pressed gunnies alongside in Calcutta was 31 ins. by 29 ins. by 29 ins., about 14 ft. 6 ins.; 30 ins. by 29 ins. by 27 ins., about 13 ft. 7 ins.; 31 ins. by 29 ins. by 28 ins., about 13 ft. 10 ins.; average weight of each bale, 9 cwt.

20 cwt. of gunnies, pressed by hydraulic machinery as in Calcutta, will stow in about 48 feet; 20 cwt. of ordinary pressed bales in 57 feet.

GUNPOWDER.—A shipmaster is liable to a fine of £20, and two shillings for every lb. of powder not delivered into a magazine on arrival at any home port. Vessels carrying gunpowder in large quantities require properly-fitted magazines, lined with some non-conducting material, which should be fitted near a hatchway for convenience of access. When entering a port with powder as cargo the powder flag should be kept flying and the pilot and Custom House authorities duly informed of its being on board. The vessel

to be anchored in the place assigned for such goods to be landed and stored. (*See* **Explosives.**)

When receiving or discharging explosives all smoking should be strictly prohibited, fires put out, and every care taken to prevent accident.

Amberite Sporting Powder.	Dimensions of Boxes.	Gross Weight of Package.
Cases containing :—		
25 lbs. in 5 lb. canisters...	23¾ ins. by 10½ ins. by 9 ins.	about 41 lbs.
25 „ „ 1 lb. „	30 ins. by 13¾ ins. by 7¾ ins.	„ 49 „
25 „ „ ½ lb. „	24¼ ins. by 19¼ ins. by 7¼ ins.	„ 52 „
Cases containing :—		
20 lbs. in 10 canisters....	15 ins. by 11½ ins. by 10¼ ins.....	„ 33 lbs.
Cases containing :—		
10 lbs. in 5 lb. canisters.	10½ ins. by 10½ ins. by 9 ins.	„ 19 „
„ „ 1 lb. „	19½ ins. by 9½ ins. by 7¾ ins.	„ 27 „
„ „ ½ lb. „	19¾ ins. by 10¼ ins. by 7½ ins.	„ 35 „

The dimensions of boxes for Amberite Rifle Powder are slightly less than for the Sporting Powder, and the gross weights rather less also.

A cubic foot of powder weighs 58 lbs.

Specific gravity of loose powder, 0·836 to 0·900.

One ton of 2,240 lbs. stows in 50 cubic feet.

The Captain of the "LOCH RANZA" had to appear at the Liverpool Police Court upon a charge of bringing into the Stanley Dock 28 lbs. of gunpowder on board his ship. He stated that the master of the ship had died abroad and he had to take charge of her, and was not aware of the quantity of powder on board for ship's use. The Magistrates imposed a small fine of 5s. and costs.

GUTTA.—A somewhat damp article in baskets ; conveyed as gunnies ; considered valuable cargo. 20 cwt. should stow in 78 feet.

GUTTA PERCHA.—*See* **India Rubber.**

GYPSUM.—20 cwt. in bags should stow in about 43 feet.

HAIR.—Generally shipped in bales or bundles which vary in size and weight. The following will be found an average :—

Bales of curled hair weigh 240 lbs., and measure 13 feet each.

Large bales ordinarily weigh 578 lbs., and measure 31 feet each.

Horse-hair bales weigh 328 lbs., and measure 31 feet each.

Compressed bales weigh 355 lbs., and measure 21 ft. 7 ins. each.

Compressed, iron-bound, 518 lbs., and measure 22 ft. 2 ins. each.

Casks measure about 12 ft. 6 ins. each.

20 cwt., one ton, of pressed horse-hair stow in 140 to 175 feet.

20 cwt., one ton, ordinary hair stow in 225 feet.

20 cwt. of unpressed hair stow in 360 feet.

Cases of rabbit-hair, each 360 lbs., 20 cwt. stow in about 210 feet.

Vegetable Hair, in bales of 108 lbs. each, 20 cwt. stow in about 175 feet. (*See* **Human Hair.**)

HAMS.—Generally shipped in barrels, sometimes in cases and casks ; American barrels about as follows :—

Barrels of smoked hams 381 lbs., 31 ins. by 25 ins. by 25 ins., measure about 11 ft. 3 ins. each.

Barrels of smoked hams 398 lbs., 32 by 25 by 25 ins., about 11 ft. 7 ins. each. (*See* **Bacon.**)

HANDSPIKES.—Weigh 13 lbs. each, measure 6 feet in length.

HANGING BEDS.—These are blocks of wood placed between casks ranged in tiers so as to keep the bilges free from each other, and are set against the quarters with an inclination towards the bilge, so that in the event of any accident they will fall inwards and be secured.

HAY.—Damp bales are said to be liable to spontaneous combustion, consequently they should not be shipped unless dry and sweet, and when in small quantities among general cargo, stowed convenient to a hatchway, where they will get plenty of ventilation and be easily got at.

Full cargoes of hay or straw should be stowed on the same principles as green fruit, allowing lots of ventilation to pass throughout the entire cargo.

Bales weigh about 270 lbs., measure 20 feet each. Compressed bales weigh 220 to 265 lbs., and measure from 12 ft. 9 ins. to 13 ft. 8 ins. each.

Unpressed bales weigh 105 lbs., and measure 32 feet each. Admiralty allows 500 lbs. to one ton measurement, pressed. Hay cut within three months is called new.

Average of bales 20 cwt., unpressed, stow in 340 feet. Average of bales 20 cwt., pressed, stow in 117 to 125 feet.

HEAVY LIFTS.—Such as 30-ton Boilers, Guns, Bed-plates, etc., should always be taken on board and discharged under properly constructed shears, fitted and tested for the work. When this cannot be done the risk must be run of working them in or out by the ship's tackle ; a large derrick and suitable gear is then absolutely necessary. Every care should be taken to have the mast well stayed,

and when stepped in the 'tween deck it should have stanchions and shores to support it below. The same care should be given to the deck under the heel of the derrick. Remember the old saying, which is most applicable to this work, " The strength of a chain is that of its weakest link." Use the best material only throughout ; never run any risk, however slight.

The following gear for the 30-ton derrick will be found necessary.

One pair of three or four-fold 15-inch iron purchase blocks for main purchase.

One pair of similar blocks to the above for span purchase.

Three iron lead blocks for falls of main and span purchases.

Two pairs of 10-inch iron double blocks for guy tackles.

Two 2¾-inch wire falls for purchases.

Two 2-inch wire falls for the guy tackles.

Several heavy shackles and wire strops will also be required.

HEMP.—The name applies to various fibres used for manufacturing purposes, as also to the plants that supply them. In the East, where the plant is indigenous, the inhabitants extract a peculiar gum or resin called " Churrah." This resin is often used to produce intoxication, whilst the drink of which it is the stimulant is called " Bhang." A further preparation is made by mixture with tobacco, and is sold under the name of " Gunja." In the northern regions the plant has been recognised from the earliest times to the present day for its fibre, which is imported into many manufacturing towns in Europe and America.

Russian hemp is considered perhaps the finest in the market. If stowed direct from the press it will in all probability heat in the holds. Merchants prefer allowing an interval of a few weeks between pressure and shipment to allow the moisture to work off. Rape seed, oil, tar, or grease will cause spontaneous combustion if stowed too near.

Bales weigh 2½ cwt., measure 10 feet each.

Manila bales weigh 280 lbs., measure 10 cubic feet each.

New Zealand bales weigh 296 lbs., measure about 14 feet each. (Uncertain.)

New York Sisal hemp bales weigh 380 lbs., measure 18 feet.

New York Sisal hemp, unpressed, bales weigh 100 to 105 lbs., and measure 21¼ to 23 feet.

Bales from Italian ports, 20 cwt. in 268 feet.

Ordinary bales of hemp weigh 400 to 500 lbs., and measure 39 ins. by 34 ins. by 27 ins., about 20 ft. 9 ins.

20 cwt., one ton, Manila hemp stow in 73 feet.

20 cwt., one ton, Calcutta, stow in 57 feet.

20 cwt., one ton, Sisal or American hemp stow in about 106 feet.

HEMP SEED.—In bags, 20 cwt. should stow in 70 feet.

HERRING.—The earliest information regarding this fish appears to be about the tenth century. In the present day it is by far the largest and most valuable fishing industry in the world. Herrings are decidedly erratic in their movements. In some seasons they appear round the British Isles in millions, at other times they seem to number a few thousands only. Their home is believed to be the deep waters of the Atlantic Ocean, but in autumn and winter they approach the shore to spawn. The finest herrings are those caught in Loch Fyne, Scotland

The principal markets for cured herrings are Germany and Russia. The system of branding barrels by the Fishing Board of Scotland greatly facilitates the disposal of such abroad, and five brands are adopted according to quality. A fee of 4d. per barrel is charged for branding. The barrels are fairly uniform in size and are said to contain from 800 to 1,200 fish each.

20 cwt. stow in 60 feet.

Salted herrings are packed in barrels. In full cargoes the lower barrels should be well bedded, and each tier securely blocked off.

20 cwt. stow in 45 feet.

Stow as moist cargo, away from dry goods.

At Otaru and other ports in Northern Japan, many thousands of tons of herrings are annually pressed for oil, and afterwards packed in bundles and shipped as fish manure.

HIDES.—Salted Hides are shipped in large quantities from South America. Most seamen are more or less familiar with the cargo, as sailing vessels were greatly in demand for it a few years ago.

The usual method adopted for stowage of loose hides is as follows :—

The holds are well dunnaged with horns, etc., until a platform is made fore-and-aft 12 to 20 inches in height. The sides are then dunnaged right up at least four inches thick, and loose hides secured inside out like mats. Stow the hides in one bulk, if possible, as it is better both for the ship and cargo ; cover each skin with salt and pickle. Always keep in mind that any part of a skin that is tucked in or doubled up and touches the ship's side, or iron, etc., unless very well salted and pickled, will rot and become useless.

Endeavour to make your hold as much of a harness-cask as you can under the circumstances. Stow even lines from end to end; use plenty of dunnage about the masts, pumps, chains, lockers, etc. Nail up a few hides inside out, always keeping the hairy side against the dunnage, and the inside next the cargo. Do not hesitate to fill every space with salt and brine, and repeat this from time to time on the voyage if possible. Keep the hatches off in fine weather, but do not let the hides get wet. Use fresh water in making the pickle.

"Stevens on Stowage" gives the loss in weight on a cargo *en route* as 15 per cent., that being the proportion of salt used for stowing. The loss of weight by evaporation, etc., say 5 per cent., not more.

Never receive on board as cargo any damaged hides, or any hides having the hair off, or the ship will be liable.

East Indian hides vary considerably in size and weight, some being salted and in casks, others dried or cured and in bales. The former are much heavier than the latter.

Dry skins should never be stowed among damp hides or moist goods. Never stow casks of salted hides over or among dry goods.

Bales of hides dried and pressed stow in 75 feet to 86 feet.

Barrels of salted hides stow in about 50 feet.

Dried skins, in bales, 20 cwt. should stow in about 120 feet.

Rabbit skins, in bales of 240 to 360 lbs. each, 20 cwt. stow in 250 feet.

Goat skins, in bales of 275 lbs. each, 20 cwt. stow in 104 feet.

Skins in bundles or bales, shipped in the East, 20 cwt. stow in 76 ft.

HONEY.—Shipped in tierces and barrels from the West Indies and other parts. Casks are liable to leak and damage dry goods. East Indian dubbers of honey should not be stowed below among dry goods, as they are not solid enough, and make improper and risky stowage.

New York casks, 21 ins. by 15 ins. by 8 ins., about 1 ft. 6 ins.

HOPS.—Stow in a cool part of the ship away from air and moisture.

Bags of hops weigh about 2½ cwt.; pockets, say 1½ cwt.

Bales weigh 187 lbs., and measure about 19 ft. 1 in.

Bales weigh 177 lbs., 56 ins. by 30 ins. by 21 ins., and measure about 20 ft. 5 ins.

Bales weigh 203 lbs., 35 ins. by 31 ins. by 19 ins., and measure about 18 ft. 9 ins.

Average of American bales 177 to 205 lbs., and measure 20 ft. 5 ins., and 21 ft.

12 bales of hops, one ton of 2,240 lbs.

Hops are sometimes carried in iron tanks.

20 cwt. of hops in bales stow in about 260 feet.

HORNS, SHAVINGS, HOOF TIPS, etc.—Loose horns are shipped from almost all parts of the world, generally as dunnage, broken stowage, and beam fillings; some particular kinds, being unsuitable for such work, are done up in bags and bundles, but in this way make bad stowage. When shipping loose horns try and avoid signing for any fixed quantity, and use the word "about," or "said to be," etc. When shipping large quantities in steamers at a low rate of freight, it is often out of the question to give the time necessary for counting them over.

The difficulty with India shippers is that each merchant thinks his particular shipment better than that of his neighbours, and will not allow them to be mixed at all. Care must be taken in such cases to keep them separate if possible, especially if shipped and receipted for as distinct lots. Horns are sometimes marked with various coloured paints, but in many cases it gets rubbed off, on or before delivery. Hence the necessity of keeping parcels separate or refusing to sign for marks, or quantities, in the receipts and B. L.

Bags of horns should not be cut adrift, unless they are shipped for that purpose; care should then be taken to state the fact in the receipts and B. L., otherwise trouble may result on delivery to the consignees.

20 cwt. of loose horns stow in about 90 feet, sometimes more.

20 cwt. of loose hoofs stow in about 95 feet. (Uncertain.)

HORSES.—When horses are taken they are accommodated on deck, placed in boxes 7 or 8 feet long, 5 to 6 feet high, and about 3½ feet broad. These boxes are usually raised a few inches from the deck with a clear passage below for the water to pass freely underneath when hosing is done. The boxes should be padded all round to a depth of 12 inches and 3 inches thick, the floor having cross-bars of wood to make the footing more secure. A strong door should be made with an iron bolt; the box well ventilated, windsails being used to assist this. The fore part of the ship should be specially attended to in this respect, as there sickness is more frequent than further aft.

In transport ships, horses are generally placed below the decks, in separate stalls, facing each other midships, leaving a clear passage

for the strappers. It is necessary to have an extra stall for every ten horses, so that one may always be removed while cleaning out the boxes.

Forage for each animal is about 6 lbs. oats, 10 lbs. hay, 6 gallons water, and about 3 lbs. bran. Care must be taken against fire, the hay being stowed clear of any risk of sparks from the galley.

HUMAN HAIR.—In bales, 4 ft. 6 ins. per bale.

ICE and SNOW.—The carriage of ice by sea is fast becoming of less importance. A few years ago all the ice used in the East had to be brought by water. Some fine American-built vessels found regular employment all the year round. In 1878 the manufacture of ice by machinery began in India ; after a sharp contest which lasted some months, the natural ice companies retired from the trade, finding it impossible to compete with the manufactured article.

There is still a trade carried on between Sweden and Norway and ports on the east coasts of the United Kingdom by small vessels belonging principally to foreigners. Many steamers have ice-houses holding from 20 to 30 tons for use on the voyage. In filling these with blocks of ice care should be taken not to damage the lead-covering on the sides and bottoms, or it may leak through and damage cargo stowed below.

All emigrant vessels going into tropical climates should have a refrigerator, or a proper supply of ice for use in hot weather.

One cubic foot of ice weighs 57½ lbs., and one lb. has a volume of 30 cubic inches.

One cubic foot of snow weighs 5⅛ lbs., and it has about 12 times the bulk of water.

One cubic foot of water weighs about 1,000 ozs. or 62½ lbs.

IMMORTELLES.—Packed in cases, which require careful handling and stowing.

20 cwt. should stow in about 350 feet.

INDIA-RUBBER.—India-rubber, in bags, can be stowed among other goods as desired, especially on short voyages. On long passages it is liable to get heated if near moist articles.

Wet Rubber requires to be stowed by itself. (*See* **Jelotong.**)

20 cwt. raw India-rubber stows in about 65 feet.

One ton stows in about 70 feet if well packed.

New York, a bale weighed 200 lbs. when shipped.

Bags of raw India-rubber shipped in Calcutta, 20 cwt. stow in 68 feet. (*See* **Oil-Cloth.**)

INDIGO.—A blue pigment prepared from various species of *Indigofera*, a plant grown in the East. The nuts or pigment used in dyeing are obtained from this plant by a manufacturing process. It is then packed in chests of teak, or other hard wood (well lined). These are sewn in gunnie cloth, marked, numbered, sorted and sampled, and shipped to different parts of the world. Ships' officers should be careful, when receiving indigo, to have it carefully tallied, each mark and number being recorded as the cases go below. The same care should be taken in discharging to prevent any questions of shortage arising, especially when delivering to dock companies, or overside into barges.

If stowed over other goods put double mats between, or the cargo may be stained by the indigo siftings. Try and stow indigo, if possible, in the between decks, well dunnaged and protected all round.

Value per chest, about £60 to £80 each.

In cases 20 cwt., or one ton, stow in about 62 feet.

IRON, METALS, RAILWAY BARS, etc.—Alloy is a certain proportion of baser metal mixed with a purer, such as copper mixed with gold.

Amalgam is a soft alloy, a mixture of mercury and metal.

Solder is an alloy used for making joints between metals. It must be more fusible than the metals it is designed to unite, and is hard or soft accordingly.

Bronze, or gun metal, is an alloy of copper and tin ; it is harder, stronger, and more fusible than copper. A high temperature in melting injures gun metal. Aluminium bronze contains about 95 per cent. of copper and 5 per cent. of aluminium.

Phosphor bronze contains copper, tin, and a small proportion of phosphorus.

There are many varieties of cast iron : the two principal are grey and white. Cast iron often retains a portion of foreign ingredients from the ore, such as earth or oxides of other metals, sulphur and phosphorus, which are all injurious to its quality and value. Cast iron expands at the moment of becoming solid, and cast iron is now made malleable by subjecting a casting to a process of annealing.

Wrought iron is made from pig iron by treatment in a puddling furnace, then hammered and rolled.

Steel is a compound of iron and carbon. There are many varieties of steel, such as Bessemer, Siemen, Whitworth, and Homogeneous Steel. It is not easily broken, welds easily, does not split or crack, bears a very high heat, and has greater elasticity than iron.

Railway Iron.—Ships loading cargoes of Iron should have at least one-third of the weight in the 'tween decks.

Railway Iron should be stowed fore-and-aft until level with the keelson, then diagonally, that is, grating fashion, keeping the rails well apart so that the weight will be raised to make the ship easy in a seaway.

Protect the ship's side with bars laid fore-and-aft on top of each other where the stowing is diagonal. Use rough sawn battens between the tiers when necessary.

Finish by stowing fore-and-aft, locking the two top tiers or so by inverting the upper rail; then lay 3-inch planks across the cargo under the beams and tomb them well down, placing the tombs about five feet apart; also wedge the upper tiers at the sides by driving large wedges down on planks put up and down before stowing for the purpose.

The 'tween deck cargo is stowed fore-and-aft and is well tombed down like the lower hold.

The end tiers have also to be lashed with chain to keep them from fetching away when the ship is pitching heavily, a space being left about a third of the distance from the midship stanchions, between them and the side, for the purpose. Bars are laid across the top and the lashing passed round them and the 'tween deck beam. With a laid 'tween deck, rails will have to be laid across the first tier on the deck to lash down to. The lashings are wedged up tight and will require attending to at sea.

Bar Iron measures about one-third of its weight.

Pig Iron well stowed runs about 10 cubic feet per ton, 20 cwt. There is generally a loss of 1 to 2 per cent. on delivery, owing to the amount of sand and grit that falls out in receiving and discharging.

Bar Iron, if possible, should be stowed so as to avoid mixing the different consignments or marks, otherwise a charge may be made for sorting at the port of delivery.

Galvanised corrugated iron sheets, six in one bundle, 61 ins. by 75 ins. by 2 ins., weighed 2 cwt. 2 qrs. 2 lbs. each bundle; 20 cwt. stowed in 36 feet.

Kegs of Steel, 20 cwt. stow in 21 feet.

ISINGLASS.—A pure form of gelatine prepared from certain freshwater fish. The best is made from the sound of the sturgeon.

In boxes, 20 cwt. stow in about 90 feet.

IVORY.—The tusks of elephants. In receiving this article care should be taken to prevent any rough handling. Being valuable, it should not be used for broken stowage or beam fillings, unless under exceptionally favourable circumstances. A large tusk is often worth £80 to £100, and if chipped or damaged the ship would be liable to pay for it. Be careful in receiving and stowing small pieces, having each piece or tusk noted, and any injury recorded in the receipts. Native boatmen or labourers will readily steal small pieces if not carefully watched by an officer or reliable person.

Grease, oil, or acid will injure ivory.

20 cwt. of loose ivory, well packed, stow in about 28 feet, often more.

JAGGERY.—A very dirty, damp sugar, extracted from the toddy palm-tree, produced plentifully on the west side of the Bay of Bengal. The new crop is usually ready for shipment in the month of February. It is counted as dead weight, and stowed in the lower hold. When new from the factory it is hard, but after the exposure to heat it becomes soft, and in a ship's hold treacle runs from it; in fact, the whole mass seems to run together, and a dark-coloured syrup oozes out and runs down the sides of the vessel into the limbers. Great care is necessary when other goods are stowed over such cargo to prevent damage. Mats are useless by themselves, planks and good dunnage are necessary. Dry sugar should never be put near jaggery without being well separated. (*See* **Sugar.**)

20 cwt. of Jaggery in bags stow in 34 feet.

The loss of weight on a shipment often amounts to 10 per cent. during the voyage.

JELOTONG.—Wet Rubber from Borneo. Each case contains two or more balls which have been rolled or made up in water, consequently moisture is constantly flowing from the packages, to the injury of any dry articles stowed round about.

Treat as wet cargo, apart from dry goods. (*See* **India-Rubber.**)

JETTISON is the throwing or heaving overboard of the ship's cargo, or materials, to lighten or save the vessel when in extreme danger. Such goods must not be swept overboard by the violence of the waves, but intentionally sacrificed by the mind or agency of man for the safety of the ship and the benefit of all concerned.

JOSS STICKS.—From Canton, packed in cases or baskets 4 cubic feet to 8 cubic feet each. No fixed weight. Value from $5 to $20 per package. Best quality $30 per package. No special stowage required.

JOWARREE, or DARI.—A native grain in bags.
20 cwt. stow in about 57 feet.

JUNIPER BERRIES.—Shipped in bags and casks. Have a decided turpentine odour after being stowed below, which might damage articles such as butter, cheese, macaroni, etc., consequently it should not be stowed near or in the same compartment.
20 cwt. stow in about 80 feet.

JUTE.—The fibre of a plant which grows in the East. Shipped in bales pressed by machinery, and bound round with rope fastenings. Samples were exhibited in this country about the beginning of the last century. In the year 1823 sufficient quantity was received to enable it to be tested as a fibre suitable for spinning purposes. For many years importers of jute met with little encouragement; spinners, manufacturers, and consumers were prejudiced against it, and it was fifteen years later before progress was made in establishing the fibre as one suitable to be made into cloth. After that, however, it began to be more freely used, and the consumption steadily and rapidly increased. Some few years ago the manufacture of jute was commenced on the Continent, and now in nearly every country in Europe there are jute-spinning and weaving factories. Much of the jute is shipped *via* London, but the direct shipments from Calcutta are getting larger annually. For many years jute was used in combination with other fibres, principally hemp and flax; now it is often used alone, the principal products of the fibre being *Hessians*, a light material used for packing and other purposes, and the heavier fabrics sacking and bagging. There is also a considerable quantity manufactured into carpets, rugs, tablecloths, and curtains. Jute is easily dyed and made to produce very bright colours.

There seems to be a decided opinion amongst many that bales of jute will ignite by spontaneous combustion; the truth of this theory, however, is not borne out by general experience. There are, no doubt, instances of fire having occurred on board vessels laden with jute, but it is an open question whether such have not been ascribable to other causes. Until more is known on this subject, however, damp bales of jute should not knowingly be received on board as cargo, unless for stowage in a safe place and by special arrangement. Bales stowed in the hold should not be allowed to touch the ship's side, or they will get black and rot with sweat, especially if shipped during the S.W. monsoon. Be particular in allowing dunnage of at least one inch space in the sides right up to the deck, for moisture

to drain off between the bales and the skin of the ship. Rape seed, oil-cake, or other heating articles should not be stowed with jute. When saltpetre is taken it should be well dunnaged and matted over before stowing jute on it. Vessels have been known to catch fire while loading jute or cotton, circumstances attending which point to the use of lighted matches, or smoking in the holds, by irresponsible parties. A strict watch should therefore be kept to provide against such dangerous practices.

In Calcutta, on the 15th May, 1891, the four-masted American ship "KENILWORTH," 2,243 tons, Captain J. C. Baker, lying off the Esplanade Moorings, was found to be on fire. At 1.40 p.m. volumes of smoke were observed issuing from the main hatch, and soon after smoke was seen issuing from the fore and aft hatches. The vessel was loading and had on board about 2,000 tons of jute cuttings, saltpetre, and other goods, all stored in the lower hold. The Port Commissioners' steam fire-boat, "HOOGLY," was alongside a quarter of an hour afterwards, and at once commenced pumping 120 tons of water an hour into the hold. They succeeded in getting the fire under. The cause of the fire was not discovered.

In general 5 bales of jute, 400 lbs. each, go to 20 cwt. or a ton.
One ton of jute stows in about 58 cubic feet.
Jute cuttings stow in about 58 to 59 cubic feet.

KAOLIN.—Fine pure white clay, called China Clay, is much used in the manufacture of porcelain. In bags 20 cwt. stows in 40 feet.

KAURI GUM comes principally from New Zealand. It is dug from the deserts there, and is believed to have come from great forests of pine long since passed away. It is most valuable when got in large lumps, so that care should be taken that it is not submitted to any unnecessary knocking about. When several lots are shipped to different consignees the packages should be kept separate, or there will be disputes about the delivery. Insert in the Bills of Lading the words "Not responsible for damage due to rottenness of the bags."

KAYU-PUTCH.—Malay White Wood Oil, but more commonly called Eucalyptus Oil. Has a strong pungent smell; should not be stowed among goods liable to damage, such as flour, tea, flake tobacco, etc. Packed in kerosene tins. (*See* **Essential Oils.**)

KERNELS OF FIR CONES.—In cases of 400 lbs. each. 20 cwt. stow in 48 feet.

KIPPERED HERRINGS.—In tins and boxes. 20 cwt. should stow in 85 feet.

KOLA.—A nut said to contain many excellent properties. Shipped in bags, each about 120 lbs. It is said that in cases of intoxication the eating of a kola nut will restore the affected person to his senses.

On a cup of chocolate and kola paste in the early morning a workman can go all day without food. This article has only lately become known, consequently it may not be all it is described. It has no objectionable properties as cargo in small lots. In large shipments it should be well ventilated for long passages, otherwise it will heat.

LAC, Lac Dye.—A resinous substance obtained from certain trees in the East. Consists partly of an exudation from the tree itself arising from the incisions made in its branches by the female insect *Coccus Lacca*, when depositing her eggs, and by a secretion from her own body, in which the eggs are ultimately hatched. The insects themselves and many undeveloped eggs remain adherent to the resinous mass, and are gathered from the twigs twice a year. In its crude state it is called "Stick Lac." This is afterwards crushed into small pieces and all dirt or other impurities removed. It is then carefully washed with a weak solution of carbonate of soda to separate the colouring matter contained in the Crude Lac; the resin is then known as Seed Lac.

From the sodic solution a valuable red dye-stuff is precipitated; this is dried and pressed into small cakes and called Lac Dye. (*See* **Shellac.**)

LACE.—A delicate fabric of considerable value. The fibres used in making it are Flax, Cotton, and Silk, gold and silver threads being sometimes introduced.

Lace is divided into two classes, real or hand-made, and imitation or machine-made. The principal varieties of hand-made lace are Point d'Alençon, Brussels, Honiton, Maltese, Point de Galle, etc.

Lace and Embroidery nearly approach each other, and may be considered in the same light as regards stowage. Packed in tin-lined cases of various size and weight. Stow where they cannot be easily got at, coolies and other labourers being very clever at pilfering such goods.

LAMP BLACK.—A soot prepared by burning in furnaces the coarser parts of tar. It is said to be liable to spontaneous combustion, especially if newly made. Packages should not be worked or stowed over, as other goods are liable to damage by dust stains.

One ton of 20 cwt. in hogsheads stows in 120 feet.

One ton in bags stows in about 140 feet.

LANG.—In bags, crushed.

LAPIS LAZULI.—In cases, 20 cwt. stow in 30 feet.

LARD.—In steamers avoid stowing near the centre of the vessel. It is essentially a delicate article, unless in casks or tierces, when it may be stowed with casks of beef and pork, etc. It is always desirable to keep such cargo away from dry or choice goods.

Tierces weigh 394 lbs. to 404 lbs. each, and measure 10 ft. 8 ins. to 11 feet.

Pails weigh 32 lbs., measure 1 ft. 1 in.; 20 cwt. should stow in 70 ft.

Racks weigh 136 lbs., and measure 5 ft. 5 ins.

The following measurements were taken alongside the ship at New York:—

One tierce weighed 394 lbs. and measured 32 by 24 by 24 inches, about 10 ft. 8 ins.

One case weighed 76 lbs., and measured 26 by 16 by 11 inches, about 2 ft. 8 ins.

Racks of four pails weighed 145 lbs., and measured 48 by 15 by 14 inches, about 5 ft. 10 ins. each.

Six tierces, one ton of 2,240 lbs. of lard, stow in 65 feet.

20 cwt. of lard should stow in about 70 feet.

20 cwt. of stearine in bags stow in 52 feet.

This article has a disagreeable, sickly odour.

LEAD.—Stowing lead piping requires care, for if not properly handled it gets bent and dented, etc., and has then to be cut and straightened before using. Among general cargoes it should be coiled in a space by itself and free from other articles of any weight. Sheet lead should be stowed on its flat. Pigs of lead, when carried as cargo in large quantities, should be built up in the hold like pig iron or copper. Among general cargo, when stowing pigs of lead, it is desirable to spread out the lower tiers so as to equalise the strain or weight, otherwise damage may result from excessive pressure on a small surface.

Pig lead should stow 20 cwt. in 8 feet; lead piping in 12 feet or more, according to size.

LEATHER.—The most costly leather in the world is known as piano leather, the secret of tanning which is known only to a family of tanners in Thuringia, Germany. This leather has but one use, the covering of piano-keys. The skins from which it is tanned are procured almost entirely in America. It is a peculiar kind of

buck-skin, the skin of a common red or Virginia deer, and a species of the animal known as the grey deer, found only in the vicinity of the great northern lakes. The German tanners have an agency in Detroit which collects the skins from the Indian and half-breed hunters, who supply the market.

Cases weigh 135 lbs., and measure 3 ft. 5 ins. each.

Leathers of the ordinary sorts are shipped sometimes in cases, often in rolls and casks. They should be stowed apart from oil, grease, tar, or acids, etc. Dried hides or skins are readily damaged by oil, a fact not easily realised until a claim is made.

Bundles of American leather weigh 368 lbs., and measure 20 ft. 3 ins.

Rolls of leather, 115 to 150 lbs., about 3 ft. 5 ins. to 14 ft. 11 ins.

Cases shipped at New York, 109 by 14 by 11 inches, measured 9 ft. 8 ins.

Bales shipped at New York, 45 by 34 by 33 inches, about 29 ft. 3 ins.

Rolls of leather, 20 cwt. stow in about 224 feet.

Bales of leather, 20 cwt. stow in about 90 feet.

Bales of tannery waste, 20 cwt. stow in 185 feet.

LEAVES.—Packed in bales of 254 lbs. each and shipped from Mediterranean ports. (*See* **Senna.**)

Dried and pressed, 20 cwt. stow in about 260 feet.

LEMONS.—In boxes measuring 2 ft. 8 ins., weighing 77 lbs. each.

LEMON PEEL.—The rind of the fruit cut into pieces and pickled in salt water.

Casks and hogsheads vary in size and weight.

Stow 20 cwt. in about 65 feet.

LIEN.—The ship-owner, and the master as his agent, has a lien on goods carried in their vessel for the freight, general average, etc.

The essential foundation of this right, however, is possession, for they cannot be compelled to part with any goods until such freight be paid. If the master once voluntarily parts with the possession of the goods out of his hands or his agent's hands, he loses his lien upon them, and cannot afterwards reclaim them. (*See* **Bills of Lading.**)

LIGHTERS.—Cargo should not be put into lighters unless the Overside Delivery Orders clearly state so, and the lightermen, or someone duly authorised, be there to receive it. This takes the responsibility off the ship when the goods are over the side.

LIME, CHUNAM, etc.—Calcination of marble or any limestone produces lime. For export it is generally shipped in casks, bags, or in bulk. In the East it is called Chunam. It should be stowed apart from any damp articles and be kept perfectly dry.

LIME (Borate of) is shipped in small quantities all the year round at Iquique, Mexillones, and Pisagua.

LINSEED.—The seed of the flax plant; contains a very great proportion of oil. Being a smooth seed it is more liable to shift than grain, requires more care in stowing, and when in bulk shifting boards are necessary. Large quantities in bulk pay less freight than in bags. Great care should be taken to secure ventilation. American linseed sent to Ireland for seed purposes is generally in hogsheads.

Linseed in bags should stow 20 cwt. in about 57 feet.

LIQUEURS—A cordial, in bottles, which should be treated in much the same manner as wines, etc.

20 cwt. in cases stow in 72 feet.

LIQUORICE, or Licorice.—In casks of juice, 1½ cwt. nearly. A case of roots shipped at Naples weighs about 2 cwt., and measures nearly 10 cubic feet. 20 cwt. of roots should stow in 86 feet.

LOAD-LINE.—*See* **Draught of Water.**

LOCOMOTIVES.—*See* **Railway Material.**

LOCUST BEANS.—Shipped from Mediterranean and Spanish ports. Stow the same as grain. Small vessels will stow about their register tonnage of beans; they require plenty of ventilation.

20 cwt. beans in bulk stow in about 48 feet.

LOGWOOD.—Bales or bundles of 236 lbs. each, from the West Indies.

20 cwt. stow in 92 feet.

LUCIFER MATCHES, in cases, are considered inflammable and should not be stowed below among other goods; Bryant and May's safety matches are, however, carried in the 'twixt decks near a hatch, as they are considered safe under ordinary circumstances.

20 cwt. of Bryant and May's, in cases, stow in about 120 feet.

LUMBER.—Cargoes of lumber, and especially long lumber on deck, should never be allowed to bear any unequal strain on the ends. The weight should be equally borne along the entire length. This cargo should be carefully wedged off and well secured to prevent the possibility of it shifting in bad weather. (*See* **Deck Load.**)

Vessels will generally stow of lumber, including deck load, about 75,000 running feet to each 100 tons net register; without deck load, 10 per cent. less. (*See* **Wood.**)

STAVES, etc., COMPARED WITH BARRELS.

In loading vessels, etc., with lumber, the following calculations may be useful:—

1,000 Barrel staves will require the room of 15 barrels.
1,000 Hogshead staves will require the room of 20 barrels.
1,000 Pipe staves will require the room of 30 barrels.
1,000 feet of Boards will require the room of 20 barrels.
400 feet of Boards are rated at a ton.

MACARONI.—*See* **Vermicelli.**

MACE.—A spice shipped from the Straits Settlements, generally in bags or cases. It should be stowed as dry choice cargo apart from oil, ghee, tar, etc.

Cases of mace average about 1½ cwt. each.
Bags average about 100 to 105 lbs. each.
20 cwt. in cases should stow in 80 feet.

MACHINERY.—*See* **General Cargo.**

MADDER.—The root of a plant which yields a bright red dye.

Compressed bales average 4 cwt. each. 20 cwt. stow in 75 feet.
Casks of ground madder vary much in weight and size.
Average of Dutch madders weigh 15 cwt., and measure 48 ft. 10 ins.
Mediterranean pressed bales average 31 feet, and weigh about 6½ cwt. each.
It absorbs moisture, and ground madder will deteriorate in value if damp.

MAGNESIA.—Shipped only in small quantities in chests or bottles. Dolomite, or Magnesian limestone, obtained in India, yields about 46 per cent. of Magnesia.

Salt water or damp air will damage this article unless well packed.
Common magnesia, cases, 2 dozen to 3 dozen bottles in each.
Packed in chests of 1 cwt.

MALT.—Grain steeped in water and made to germinate. It is then dried in a kiln and packed. When in bulk and going long voyages, stow in bins lined with tin, or in iron tanks, and exclude all air if possible.

New York barrels Maltine 32 ins. by 23 ins. by 23 ins., about 9 ft. 10 ins. each.
Malt stowed in a hold with dry goods will cause damage.

MANIFEST.—The Ship's Manifest must clearly state the name and tonnage of the vessel, and the place to which she belongs, also the master's name; a full description of all packages on board, with the marks and quantity of the goods contained in each package, and their destination; names of the respective shippers and consignees, so far as such particulars are known. It should be made out, dated and signed by the master, and is usually signed also by the Ship Broker who clears the vessel out at the Custom House. There is a penalty for being unprovided with a proper manifest, and for convenience there should be two copies; one is required by the Customs authorities on arrival. Ships are also required to add a list of stores. A separate manifest is necessary for tobacco if there is much of it on board.

The master of a vessel sailing with a cargo for any of the Spanish ports ought to bring two copies, exactly alike, which must contain the nationality, name, description, and tonnage of the vessel; the master's name, with the date, and the port where he took the cargo on board; the port or ports said cargo is bound to; the marks, counter-marks, num er of packages, and their description, such as bales, boxes, chests, pipes, half-pipes, barrels, tierces, etc.; a declaration of the quantity and quality of the merchandise in each package, as near as possible (especially tobacco); the names of the shippers and consignees, or whether they are to order. Everything to be written in words at length, except the numbers of packages, and on sheets of paper or proper manifest forms.

When a vessel has taken cargo at more than one port, she ought to have a separate manifest from each port where she has received a shipment.

At the end of the manifests the master should attach a Store List and List of Passengers, both cabin and steerage, making all other declarations he may deem necessary; he should then sign his full name, etc. (*See* **Stores.**)

MANURES.—When possible manures should go in a hold by themselves, apart from other goods. The vapour from superphosphates will attack articles of an edible nature, rendering them unfit for use. Before receiving any shipments of this nature full information should be obtained as to its liability to putrefy, decompose, or damage other goods.

Fish manure, guano, glue, refuse, wool, and other manures have generally a most offensive odour and should not be stowed among other cargo. Manufactured chemical manures may sometimes be carried below, provided they have no objectionable properties beyond a liability to heat when in the hold. This can, however, be ascertained beforehand.

Phosphate Manure shipped at Antwerp, 20 cwt. piled in a heap, measured 4 ft. 4 ins. by 2 ft. 10 ins. by 2 ft. 1 in., square 25 ft. 7 ins.

20 cwt. of manufactured manures should stow in 40 feet.

MARBLE.—When taken in as stiffening marble should be laid close together flat on the bottom, and not subject to any unequal strain from above. Be careful in seeing it well blocked off and secured against the possibility of shifting in heavy weather. Marble will readily damage if stowed near oil, grease, iron, etc.

In small shipments of marble slabs it is usual to stow them on their edges.

20 cwt. of marble should stow in 14 feet.

20 cwt. of slabs stow in 17 feet, often more.

MARGARINE.—Oleo-margarine, or artificial butter, generally packed in tubs or firkins. Stow the same as butter or lard.

Tubs average 73 lbs. each, and measure 2 feet each.

20 cwt. should stow in 65 to 70 feet.

MARJORAM.—Packed in bales of 220 lbs. each. 20 cwt. stow in 220 feet.

MASTIC.—A gum or resin which exudes from the Lentisk tree, used in varnish. Has a tendency when heated to run, and might damage other goods if stowed over, or too near. (*See* **Gum.**)

MATCHES.—About 40,000,000 feet of timber are annually made into matches in America. (*See* **Lucifer Matches.**)

MATS.—Generally made of grass, reeds, or bamboo. Bombay mats are considered the best for use in the Eastern trade. China and Calcutta mats are the largest and heaviest, but do not last so long in the holds as the former.

About 5,000 to 6,000 Bombay mats are required to stow an Indian cargo in a 4,000 ton steamer.

Canton matting, generally packed in rolls, from 24 inches to 9 feet in length, and weighing variously, 20 cwt. stow in 130 feet.

20 cwt. of mats stow in about 200 feet (cargo mats).

MEAT.—Large shipments of dead meat are now brought over

from various parts of the world to Great Britain, steamers and sailing vessels being fitted with refrigerators and cold chambers, where the meat is kept below freezing-point during the entire voyage.

Beef packed runs about 95 cubic feet to the ton.

Quarters and pieces about 130 cubic feet per ton of 20 cwt.

New Zealand mutton, 110 feet per ton of 20 cwt.

River Plate, about 115 cubic feet per ton of 20 cwt.

MICA.—From trade statistics it is proved that India is the principal producer of this mineral.

In casks, 20 cwt. stow in 60 feet.

MILE, etc., of different Nations.

	English Yards
Arabian mile	2,148
Bohemian mile	10,137
Brabant mile	6,082
Burgundy mile	6,183
Chinese li	629
Danish mile	8,244
Dutch mile	6,395
English mile, statute	1,760
English mile, geographical	2,025
Flemish mile	6,869
French posting league	4,263
French marine league	6,075
French legal league of 2,000 toises	4,263
German mile, geographical	8,100
German mile, long	10,126
German mile, short	6,859
Hamburg mile	8,244
Hanoverian mile	11,559
Hesse mile	19,547
Hungarian mile	9,115
Irish mile	2,240
Italian mile	2,025
Poland mile, short	6,071
Poland mile, long	8,100
Portuguese legoa	6,760
Prussian mile	8,237
Roman mile, modern	2,028
Russian verst	1,167
Saxon mile	9,904

MILLET, or Dhurra.—A common name for several species of small seed. In bags, 20 cwt. stow in from 44 to 51 feet.

MINERAL WATERS.—Cases contain racks to divide the bottles and keep them in their place. Care should be taken to handle such packages carefully; avoid moving about after having once been stowed. Soda-water bottles sometimes explode in hot weather.

Casks and cases average 220 lbs. each, but are uncertain. 20 cwt. should stow in 70 feet when in cases.

MIRABOLAMS.—A wild berry about the size of a walnut exported from Eastern ports. Being a light article it is generally shipped with other goods of a heavier nature. It is not easily damaged, has no smell, and stows with almost any dry article.

Packets or half-bags of mirabolams make excellent broken stowage.

20 cwt. stow in 67 feet.

MOHAIR.—In bags, 20 cwt. stow in 240 feet.

MOLASSES.—In casks, puncheons, and hogsheads, requires no dunnage. The ground tier must be straight fore-and-aft, each side of the keelson, the heads about an inch apart. In placing the ground tier, the breakage caused by the mast is filled up with wood, and each cask should be carefully bedded and chocked. The casks must rest fairly on the ground tier, to equalise the weight all over and prevent springing. Four heights are usually taken, the third being placed empty, bedded and chocked, and filled by a hose. (*See* **Syrup.**)

In casks 20 cwt. stow in 70 feet.

Molasses is now generally carried in tank steamers. The average specific gravity being 1·340, it runs about 27 cubic feet to the ton in bulk.

MOTHER OF PEARL SHELLS.—Mother of Pearl Shell-fishing forms one of the principal industries of Northern Australia. Between Cossack and King George's Sound there are a number of small craft varying from 10 to 140 tons employing 400 to 500 men of various nationalities at the work. The diving dress is much used among them; although in shoal water it is often dispensed with. Depths of 20 to 22 fathoms are, however, reached by its aid. Anything beyond this is injurious to the divers, who are sometimes paralysed by the too great pressure or weight of water. The smaller boats, called luggers, gather the shells into the schooner, where they are opened under supervision, cleaned, and packed in cases for the London market.

Pearls are sometimes found, but they are rare and not of great value. When properly cleaned and well packed M. O. P. shells can be stowed among general cargo.

Cases of shells weigh about 3 cwt. each, and are worth about £170 per ton.

Shells are also shipped from Bunder Abbas, Linga, and other ports in the Persian Gulf. Clean shells have no smell and as a rule are free from objectionable qualities.

Well packed they stow rather heavy, 20 cwt. in 45 ft. (uncertain).

Mother of Pearl shipped generally in cases; if declared of value should be put under lock and key.

Cases weigh 350 lbs., and measure 17 ft. 2 ins. each.

MOWRAH FLOWERS.—A moist, damp article giving off vapour, and should be stowed accordingly.

One ton of 20 cwt. stows in about 37 to 40 feet.

MOWRAH SEEDS.—In bags, 20 cwt. stow in 60 feet.

MUNGO.—*See* **Rags.**

MUNJEET.—A part of a plant cultivated in Asia, and used as a red dye-stuff. Shipped in bales, casks, and cases. (*See* **Madder.**)

20 cwt. should stow in 90 feet.

MUNSELLS.—From China ports shipped to India in wooden tubs. Net weight 90 to 95 catties, measuring 2 feet to 3 feet, value $8·7 to $9·50 per picul.

MUSICAL INSTRUMENTS.—These should be packed in tin-lined cases to prevent damage from sweat or rust, etc. Stow in a part of the hold away from moist or heavy articles, and keep the marked side uppermost. Handle the packages gently to prevent jar or injury to the internal parts, which are fragile and easily displaced by rough usage. Average weight of American Organs in cases 353 to 365 lbs., measuring 44 ft. 6 ins. to 59 ft. 5 ins.

20 cwt. should stow in 400 feet.

MUSK.—The odour of this article is very pungent and lasting. It will penetrate and damage articles such as tea, coffee, sugar, flour, etc., if stowed in the same hold. (*See* **Perfumes.**)

MUSTARD can be treated as dry cargo when properly packed. Generally in kegs, tins, bottles, etc.

MUSTARD SEED, or Sursee, or Surson.—Indian names for varieties of mustard seed, as *Sinapis Nigra*, *S. dichotama*.

In bags 20 cwt. should stow in 60 feet.

NAPHTHA, and Inflammable Articles generally.—There are many volatile liquids such as brandies, rum, gin, whisky, ether, spirits of wine, and other alcoholic liquors, etc., which are well known to be highly inflammable, but it is not so well known that these give off an invisible gas which is as inflammable, and much more dangerous, on account of its not being seen. The greatest care should be taken to give free ventilation where such cargo is stowed and on no account allow anyone to enter such places with a naked light. Remember to keep goods of this class separate from all cargo of an edible nature. Naphtha is mostly carried in tank steamers. Specific gravity ·698. (*See* **Dangerous Goods.**)

Regulations of the Board of Underwriters of New York.

Gasolene may be shipped under deck in quantities not to exceed 1,000 cases in any one vessel at one time, in drums not exceeding ten gallons each, having an excess capacity varying in ratio from 15 per cent. on ten gallons, to 5 per cent. on five gallons, and which are to be made of sheet iron, tinned, calamined or galvanized, of a thickness not less than No. 20 Birmingham gauge. To be of drum shape, with body riveted and soldered, and having convex heads, and to be tested to a pressure of 150 pounds per square inch. Twenty per cent. of the drums to be tested.

Drums to be packed in cases of one inch stuff, containing not more than 10 gallons each, to be stowed so as to be readily accessible from the vessel's hatches, and in lots of not over 350 cases at either hatch. (Sept. 1882.)

Naphtha may be shipped under deck in quantities not to exceed 1,000 cases in any one vessel at one time, in drums not exceeding ten gallons each, having an excess capacity varying in ratio of from 10 per cent. on ten gallons, to 5 per cent. on five gallons, and which are to be made of sheet iron, tinned, calamined or galvanized, of thickness of not less than No. 27 Birmingham gauge. Having convex heads, and to be tested to a pressure of 80 pounds to the square inch. Twenty per cent. of the drums to be tested.

Drums to be securely packed in cases containing not more than ten gallons each, to be stowed so as to be readily accessible from the vessel's hatches, and in lots of not over 350 cases at either hatch.

When Gasolene and Naphtha are shipped in the same vessel, the number of drums of both must not exceed 1,000, and not more than 350 must be stowed in either hatch.

Notification where and when shipments are to be made to be

furnished one day in advance, to the Surveyor authorised to issue certificates of approval of Naphtha and Gasolene shipments.

Subject to the requirements of the U.S. Statutes. (Feb. 1897.)

NAPPEE.—Partly-dried fish, in bundles, carried between the Straits Settlements and Burmah. The odour from this cargo is very objectionable, and permeates the whole ship. Wet nappee is infested with maggots; the moisture that drains from it is most offensive, and will readily damage other goods. Care should be taken to keep nappee by itself, and in a part of the hold free from dry and perishable articles.

NESTS, Edible.—The gelatinous nest of a species of swallow found widespread over Eastern seas, and gathered from caves and rocks about four times a year, immediately the eggs are laid. After being cleaned they are sorted, according to their purity and colour, into three qualities, *white*, *medium*, and *black*, then packed and shipped to their destination.

Stow as valuable, and away from damp or scented articles.

NEWSPAPERS.—*See* **Paper.**

NIGER.—A black, shining seed, shipped chiefly from Madras or Bombay, used for making oil. The grains are long and almost the size of hay-seed.

One ton of 20 cwt., in bags, stows in 63 feet.

NITRE, or NITRATE OF SODA.—Cubic Nitre, sometimes called Chilian Saltpetre, shipped principally from ports in South America, has many of the objectionable properties of Saltpetre, being soluble in water and forming a dangerous compound when brought into contact with organic matter, etc. Being very liable to evaporate, when in a damp place, care should be taken to keep it dry and apart from other articles liable to damage. Shippers generally allow 3 per cent. for drainage during the voyage. There is an objectionable odour from this article when stowed in any quantity.

20 cwt., in bags, should stow in 32 feet. (*See* **Saltpetre.**)

NITRO-GLYCERINE.—A compound of glycerine and nitric acid, discovered in 1847 by a M. Sobrero; but it was a Swedish engineer, M. Nobel, who succeeded in making practical its manufacture and use. At the same time he first experienced the immense danger attached to the employment of the compound, for in 1868 a factory erected by him at Stockholm blew up, and the whole staff of chemists and workmen lay buried in the ruins. Since that date the manufacture of nitro-glycerine has been forbidden in Sweden. In its

manufacture it has the appearance of a yellow or brownish oil, heavier than water. It is crystallised in the form of long icicles by exposing it to an exceedingly low temperature. In this form it will detonate by a slight concussion, especially if it is not very pure. Instead of using pure nitric acid to mix with the glycerine, sulphuric acid is also added; this serves as an absorbent for the water set free during the action of the nitric acid on the glycerine, thus preventing a loss of strength. A second advantage is that the final product, *i.e.*, nitro-glycerine, being insoluble in the mixed acids, is precipitated and can be easily separated, whereas it is soluble in pure nitric acid. Nitro-glycerine is very poisonous; even its absorption by the skin is dangerous. It is rather volatile, and as it must be kept in hermetically-sealed receptacles a strong pressure is exercised on the mass, and in this condition the least shock may cause an explosion. (*See* **Explosives.**)

NOTES.—*Demand Notes* are payable on presentation without grace, and bear legal interest, after a demand has been made, if not so written. An endorser on a demand note is holden only for a limited time, variable in different States.

A Negotiable Note must either be made payable to bearer, or be properly endorsed by the person to whose order it is made. If the endorser wishes to avoid responsibility, he can endorse "without recourse."

A Joint Note is one signed by two or more persons, each of whom becomes liable for the whole amount.

Three Days Grace are allowed on all time notes after the date for payment expires; if not then paid the endorser, if any, should be legally notified to be holden.

Notes falling due on Sunday, or on a legal holiday, must be paid the day previous.

Notes dated Sunday are void.

Altering a note in any manner by the holder makes it void.

Notes given by minors are void.

The maker of a note that is lost or stolen is not released from payment if the amount and consideration can be proved.

Notes obtained by fraud, or given by an intoxicated person, cannot be collected.

An Endorser has a right of action against all whose names were previously on a note endorsed by him.

NUTMEGS.—In cases, 20 cwt. stow in 60 feet.

NUTS.—Nuts require to be well dunnaged, kept dry, and not

put in the same hold with bone-dust, guano, etc., which depreciate their value.

Palm kernels, shipped from the West Coast of Africa, weigh about 32 to 56 lbs. per bushel. However, ships can generally load full cargoes, the weight decreasing *en route*. Small vessels carry a little under their D.W. capacity. The crew on vessels having their cabins and forecastle below the deck may suffer from sickness during the voyage unless provision is made for living on deck. Nuts often generate great heat and steam, which in some instances prove fatal to life itself.

Cocoa-nuts are usually shipped in bags or nets, sometimes loose. On moderately short voyages they can be carried below without injury to other cargo. They should not, however, be stowed in the lower holds, and should have ventilation in fine weather. They will not suffer by carriage on deck in a safe place, and a little salt water will not harm them.

Bags contain 100 cocoa-nuts.

Shelled Almonds in bags, 20 cwt. stow in 70 feet.

Shelled nuts in casks averaging 275 lbs. each, 20 cwt. stow in 80 feet.

Shelled nuts in bags averaging 165 lbs. each, 20 cwt. stow in 64 feet.

Pistachio nuts, in cases, 20 cwt. should stow in 72 feet.

Bales of Walnuts, each 253 lbs., 20 cwt. should stow in 182 feet.

Barrels of Brazil nuts, each 160 lbs., 20 cwt. stow in 90 feet.

NUX VOMICA.—One ton of 2,240 lbs. stows in 75 feet.

OAK LOGS.—20 cwt. in 50-foot planks stow in 48 feet.

OAK EXTRACT.—In barrels weighing 640 lbs. and measuring about 15 feet each, 20 cwt. stows in 53 feet and requires careful handling. (*See* **Tan Extract—Mediterranean cargo.**)

OARS.—Measure 12 feet, weigh 10 lbs.; measure 14 feet, weigh 14 lbs.; measure 15 feet, weigh 16 lbs.; measure 16 feet, weigh 17½ lbs.; measure 17 feet, weigh 20½ lbs.; measure 18 feet, weigh 23 lbs.

Piled-up Oars average 16 feet long, 7 feet high, 14 feet wide, say—

150 oars 12 feet long @ 12 lbs. each = 1,800 feet.
200 oars 14 feet long ,, 14 lbs. each = 2,800 feet.
300 oars 15 feet long ,, 16½ lbs. each = 4,500 feet.
600 oars 16 feet long ,, 17½ lbs. each = 9,600 feet.
400 oars 17 feet long ,, 20½ lbs. each = 6,800 feet.
350 oars 18 feet long ,, 23 lbs. each = 6,300 feet.

Average ton, about 1,493 running feet = 2,240 lbs.

OATS in bags are much lighter than most grains ; care should be taken to give plenty of ventilation, otherwise they will heat and become damaged. Canadian and Danish Oats are heavier than other sorts. (*See* **Grain.**)

20 cwt. of ordinary kinds of oats stow in 80 feet.

20 cwt. of oats, in bags, should stow in 88 feet.

OATMEAL.—The flour of oats. Generally packed in casks, bags, or barrels. Stow the same as flour or other dry goods.

8 sacks of meal equal one ton.

Bags contain 122 to 128 lbs. each, and measure 4 ft. 2 ins.

Sacks 228 to 280 lbs. each, measure 5 ft. 7 ins.

20 cwt. stow in about 65 feet.

OCHRE.—Shipped in barrels which require careful handling.

20 cwt. stow in 50 feet.

OIL.—Essential Oils are packed in bottles or iron drums,which are large and very strongly protected by wood on the outside. Care should be taken not to stow in a hold where tea, flour, or other articles liable to damage are carried. One pint-bottle placed in the hold will spoil an entire cargo of tea.

Vegetable oils are said to promote spontaneous combustion if stowed with coir, rags, hemp, cotton, etc. For long voyages a piece of leather might be nailed across the bungholes of casks ; some recommend a piece of iron hoop instead of leather. Oil should never be put in the between decks with general cargo below, being at all times a dangerous and uncertain article, where other goods are concerned.

An old experienced ship-master writes:—" I never trust oil packed in any shape or form among dry goods, having found from experience that unless it is well stowed in the bottom of the ship, and clear of all other articles, one is sure to hear of some damage, for which the ship has to pay."

Cocoa-nut and Castor Oils are often shipped from India in second-hand casks or tins. On one occasion, when objecting to a shipment of castor oil in old kerosene packages, at Bombay, the shipper said that he expected a loss of about 10 per cent. from leakage on the voyage. It is therefore the duty of the ship's officers to note clearly in their receipts any casks or cases that are second-hand or inferior, to prevent claims for short delivery.

In stowing the lower holds, care should be taken to put as little weight of other cargo over case oil as possible. Oil cargoes do not require dunnage ; in fact, they stow better without it. Casks are

stowed bilge-and-cantline ; this mode can be adopted when economy of space is an object. Some recommend casks to be double-bedded and double-quoined, as oil makes them liable to slide, and the second bed is recommended to meet this liability. (*See* **Casks.**)

The best Olive Oil is made up at Leghorn in half-chests containing 30 flasks, of two gallons nearly.

Seville Oil is packed in three sizes: pipes, export casks, and quarter casks.

Oil must be kept at a distance from marble. Small parcels of oil in cases, and bottles of salad oil in wooden boxes, ought to be placed separately and apart from rough goods. Paraffin, kerosene, petroleum, and other oils considered inflammable should be approached with care by anyone having a light ; in fact, lamps or other lights should never be allowed where it is being worked in any quantity, especially in the holds or store-rooms. (*See* **Petroleum.**)

Fish Oil in cases, such as old kerosene tins, etc., 20 cwt. stow in about 55 to 60 feet.

Barrel of Fish Oil weighs 445 lbs., and measures 11 feet.

Barrel of Lard Oil weighs 450 lbs., and measures 11 feet 10 ins.

Barrel of Lubricating Oil weighs 400 lbs., and measures 11 ft.

Lubricating Oil sent to India, casks 1,442 lbs., measure 37 feet each. 20 cwt. stow in 60 feet.

Five barrels of sperm, and six barrels of neatsfoot oil, one ton of 2,240 lbs.

One ton of 2,240 lbs. oil stows in 60 cubic feet generally. In casks, 20 cwt. of oil manufactured from seeds stow in 66 feet.

Cases of oil in tins, 20 cwt. should stow in 55 feet.

Baskets containing bottles, 20 cwt. stow in 96 feet.

Cases of bottles, 20 cwt. should stow in 75 feet.

Drums, or tins of oil, 20 cwt. should stow in 49 feet.

Large-sized iron drums, 4 cwt. 3 qrs. 7 lbs. each, measure 9 feet 5 ins. each. 20 cwt. stow in 40 feet.

OIL-CAKE, and Poonac.—After the oil has been extracted from seeds, the material remaining is pressed into Oil-Cake, which makes an excellent food for cattle, and is largely exported from seed-growing countries to different parts of the world. It is usually packed in bags or barrels. Cake in bags or sacks should not be stowed where bad ventilation, inherent vice, or the neighbourhood of a heating cargo will cause damage to the oil-cake or other goods in the same hold.

Rape-seed cake has an oily smell, looks hard and dry at first, but

after being in the ship some time often gets mildewed and heated, especially if new. Some ship-masters think it depends on the nature of the cake, but consider it generally safe to stow with other goods if well ventilated. Turpentine, tar, or other highly-scented articles are said to render oil-cake unfit for use. Palmist cake has a bad odour, which might cause damage to other goods if not guarded against.

New York bags weigh 226 to 242 lbs. each, and measure 5 ft. 8 ins. to 6 feet.

Barrels weigh 237 lbs. each.

Nine to ten barrels of oil-cake, one ton.

Eight to ten sacks of oil-cake, one ton.

One ton of 2,240 lbs. of oil-cake, in bags, stows in about 46 cubic feet.

East Indian oil-cake, in bags, 20 cwt. stow in 60 feet.

Mediterranean cotton, linseed, ground-nut, and other cake, 20 cwt. stow in 54 feet.

Niger-seed cake, in bags, 20 cwt. stow in 53 feet.

Palmist-seed cake, in bags, 20 cwt. stow in about 56 feet.

OIL-CLOTH, Waterproofs, Mackintosh, etc.—Articles of this nature should be kept in a part of the vessel where they can be readily got at, being liable to spontaneous combustion. (*See* **Dangerous Goods, Inodorous Felt, etc.**)

OIL PAPER GOODS.—Chinese fans, umbrellas, etc., are not very inflammable but liable to spontaneous combustion, consequently much care is required in stowing. Packed in cases or bales. Size and weight various.

OILING THE SEA.—The use of oil in smoothing the breaking wave is not quite within the subject of this work; it is, however, of so much importance to sailors generally that a few words may not be out of place; perhaps some unbelieving mariner may be induced to try its magical effect in the hour of need. The best oil for this purpose is undoubtedly fish oil; other kinds, such as olive oil, have much the same effect, but are not so reliable. The surest means of application is through a pipe on the weather side, such as a W.C. pipe. Bags may also be hung out fore and aft as required, but to be of service they require pricking from time to time.

The "White Star" steamers employed carrying cattle from New York have properly fitted pipes from the engine-room leading over each bow, through which oil is automatically pumped in bad weather. This often enables them to cross the Atlantic even in the winter months with their hatches off. Every ship, and each boat in such

ship, should have a store of oil and canvas bags fitted in their place, ready for use at a moment's notice.

The following information, supplied by the United States Meteorological Department, was collected and verified by Mr. Everett Hayden, U.S.N., after the great storm, known as "the Blizzard," off that coast, March 11th to 14th, 1888:—

"To cross a bar in heavy weather, after battening down all hatches, etc., take two pieces of india-rubber pipe about 20 feet long and one inch in diameter. Put these through the hawse pipes, one on each side, and let their ends trail in the sea. On the upper end of each piece of tube lash a good-sized funnel, secure it to a stanchion, in a vertical position, and station a man at each with a three-gallon tin of colza oil. When the vessel enters the outermost sea that breaks on the bar, let each man gently pour the oil down the pipes. This will smooth the bar immensely and your vessel will steer much better. Almost any oil of animal or vegetable origin will do, but petroleum is not of much service, excepting to mix with and thin the other if necessary.

"When lying-to in a gale; head to wind and drifting slowly, a little oil bag hung over the weather side, or oil poured down a pipe well forward, is of great service in preventing the sea from breaking aboard. To round-to, prepare a sea anchor, watch for a smooth spell and then put the helm down, heave overboard a few gallons of oil and float the sea anchor. Keep pouring the oil on the sea, down a weather pipe or scupper, while the ship is coming up to the wind.

"A well-equipped sailing ship, even if deeply laden, will lie-to under a closely-reefed topsail, or tarpaulin in the rigging, and weather almost any gale so long as she is not taken aback. Sailing vessels under these circumstances nowadays often use an oil bag paid out to windward to smooth the sea still more. This is the ideal position of a laden vessel in a dangerous storm. Whilst towing a disabled ship over a bar, or where the sea is very wicked, a couple of oil bags over the stern will ease the sea on the tow.

"In a good steamer, to take a shipwrecked crew off a wreck, run to windward of the wreck, lower the lee boat, put your vessel head to sea and dead to windward, and let the boat drop down towards the wreck, veering out on the line, and constantly pouring considerable oil into the sea, which will keep the sea smooth between your ship and the wreck. In using oil bags in heavy weather they should be weighted if hung over the side, in order to keep them down. When scudding it is best to pour the oil down the closet pipes."

Great Storm off the Atlantic Coast.

New York pilot-boat "Charles H. Marshall" (No. 3) and other vessels.

(Report communicated by Boat-keeper Robinson, on behalf of the pilots of No. 3.)

March 10th, 1888.—"Left Staten Island on a cruise to the southward, moderate breeze from the E.N.E., which continued all day; 7 p.m. hove to, with the Highland Light in sight, bearing N.N.W. distant 18 miles; 8 p.m. the wind began to increase and it commenced to rain; double-reefed the sails and lay hove-to all night. On the 11th, as the weather looked threatening, two more reefs were put in the sails and the schooner was headed to the northward, intending to run into port for shelter. During the afternoon the breeze increased to a strong gale and sail was reduced still further. When about 18 miles S.E. from the lightship a dense fog shut in, and it was decided to remain outside and ride out the storm.

"The wind hauled to the eastward toward midnight; at 3 a.m. it looked so threatening in the N.W. that a fourth reef was taken in the mainsail, and the foresail was treble-reefed. In half an hour the wind died out completely. and the vessel lay in the trough of a heavy sea that was threatening every moment to engulf her. She was then about twelve miles E.S.E. from Sandy Hook lightship. In twenty minutes the gale struck her with such force from N.W. that she was thrown on her beam ends. She instantly righted again, however, but in two hours was so covered with ice that she looked like a small iceberg.

"By 8 a.m. the wind had increased to a hurricane, the little vessel pitching and tossing in a terrific cross-sea, and only by the united efforts of the entire crew was it possible to partially lower and lash down the foresail and forestaysail. No one but those on board can realise the danger she was in from the huge breaking seas that rolled down upon her. The snow and rain came with such force that it was impossible to look to windward, and the vessel was lying broadside to wind and sea. A drag was rigged with a heavy spar, anchor and hawser, to keep her head to sea and break the force of the waves, but it had little effect, and it was evident that something must be done to save the vessel.

"Three oil bags were made of duck, half filled with oakum saturated with oil, and hung over the side forward, amidships, and on the weather quarter. It is admitted that this is what saved the vessel and the lives of all on board, for the oil prevented the seas from

breaking, and they swept past as heavy rolling swells. Another drag was rigged and launched, although not without great exertion and danger, and this helped a little. Iron bolts had to be put in the oil bags to keep them in the water; and there the little vessel lay, fighting for life against the storm, refilling the oil bags every half hour, and fearing every instant that some passing vessel would run her down, as it was impossible to see a hundred feet in any direction. The boat looked like a wreck; she was covered with ice and it seemed impossible for her to remain afloat until daylight. The oil bags were replenished every half-hour during the night, all hands taking turn-about to go on deck and fill them, crawling along the deck on hands and knees and secured with a rope in case of being washed overboard. Just before midnight a heavy sea struck the boat and sent her over on her side; everything movable was thrown to leeward, and the water rushed down the forward hatch. But again she righted, and the fight went on. The morning of the 13th it was still blowing with hurricane force, the wind shrieking past in terrific squalls. It cleared up a little toward evening, and she wore around to the northward and eastward, but not without having her deck swept by a heavy sea.

"It moderated and cleared up the next day, and after five hours' hard work the vessel was cleared of ice and sail set for home. She had been driven 100 miles before the storm, fighting every inch of the way; her crew, without a chance to sleep, frost-bitten, clothes drenched and no dry ones to put on, food and fuel giving out, brought her back to her station on the bar as usual.

"In the experience of the yacht 'Iroquois,' off Henlopen, the special feature of the report received from her sailing master, Captain Norton, is that relating to the use of oil. At 1 a.m. on the 12th when it was blowing a most terrific gale, he found the vessel was making too much headway for safety; he took in the reefed forestaysail and foretrysail, and put over a patent sea-drag, but the hawser carried away and he lost it.

"He then thought of a case of oil on board, containing four 5-gallon cans; made three bags of No. 5 cotton, large enough to hold about two gallons apiece; put two quarts in each, and hung them over the weather bow, but the oil congealed and would not run out through holes he had made with a sail-needle. Then tried the oil through the pipes of the closet in the forecastle, near the bow, putting a few tablespoonfuls in the bowl and then pumping it out. It was truly wonderful to see the effect it had on the sea. A huge comber would come down upon the vessel, threatening to bury her

20 feet deep. The comb would strike a patch of oil no larger than a common dining-table, and in an instant the top of the sea was smooth and round, without even a wind ripple, and the little schooner would pop up on top of it as easy as a gull. He stood on the deck more than an hour watching the effect and then went below, feeling that so far as breaking waves were concerned he was perfectly safe as long as the oil held out.

"The oil used in this case was a soft, greasy oil, which he thinks is the best. The yacht rode out the storm in perfect safety, without any damage, although both topmasts were up and jib-boom out. Used fifteen gallons of oil in thirty-six hours. Captain Norton had followed the sea for thirty years, seventeen of them as master, but never experienced a worse gale than this."

Captain Trim, of the American schooner "ISAAC ORBETON," was caught in the hurricane off Absecon; foresail blown away; sea very high and irregular; rain, sleet, and snow; wind from W.N.W. The vessel was heavily laden with sugar, and Captain Trim hove-to and prepared to use oil to prevent the sea from breaking over her. Rigged six oil bags, as follows:—From the weather cat-head, from each weather chain, on the boat davits, and on a buoy to windward (a heavy piece of timber secured to the vessel by a lanyard); filled the bags with oakum, pricking the canvas well with a sail-needle, and used equal parts of fish oil and kerosene, refilling the bags about every two hours. No water came on board during the thirty hours the oil was used. The vessel was very deep and must otherwise have been greatly damaged by the heavy seas, which, though very high and irregular, were reduced by the oil to long rolling swells. He had never tried the experiment before, but regards the use of oil as a most valuable thing if the bags are attended to and not allowed to get empty. Used about 10 gallons each of fish oil and kerosene.

Captain Falker, of the "MESSENGER," made use of oil for the first time in this storm. He was thoroughly converted and is now a firm believer in the great advantages to be gained. Not having any regular appliances, he put a can of porpoise oil, with a small hole in the bottom for the oil to drip through, in the after closet, thus allowing the oil to drip slowly into the sea. The result was astonishing. The oil cut the combers completely from the running seas, and made the water so smooth about the vessel that little or no water came on board. The vessel was hove-to for fifty-two hours and only five gallons of oil expended.

Finally, Captain Meyer, of the "JOHANNA," when he found it necessary to abandon his vessel, in a sinking condition, was lying-to on the starboard tack, a strong north-west gale blowing, the seas running very high and breaking. The German barge "WESER" ran down to leeward and hove-to. Got two boats ready, hove two cans of rape-seed oil over to windward, punctured so that the oil could run out, and manned the boats, each of which was supplied with fish oil in cans. Pulled to the "WESER," all the time pouring oil over the stern of the boats. The boats were half-full of water when they got alongside, but they would never have reached her at all had they not used oil.

A recent case is that of the SS. "VOLTURNO," which was destroyed by fire in mid-Atlantic during heavy weather on October 9th, 1913, whilst on a passage from Rotterdam to New York, having on board in all 654 persons, passengers and crew.

The fire started forward and made such rapid headway that it was thought advisable to launch the boats. The sea was so heavy that the attempt met with disaster and considerable loss of life. The SS. "CARMANIA" then came up in response to the wireless calls for assistance, and succeeded in launching a boat safely, but it failed to reach the "VOLTURNO" and had great difficulty in returning. Several other steamers arrived on the scene, but the sea was so heavy that their attempts at rescue were unavailing. Then fortunately the oil-tank steamer "NARRAGANSETT," loaded with lubricating oil, came to the rescue, and, steaming round the "VOLTURNO," pumped oil on to the water, which had a marvellous effect in smoothing the sea, thus enabling the waiting steamers to effect the rescue of the remaining people on board; 520 lives in all were saved.

Such accounts need little or no comment. The mere publication of the facts is enough to convince anyone.

OLIVES.—In casks, should be treated as moist goods. Cases containing bottles average 220 lbs. each.

20 cwt. stow in about 68 feet.

ONIONS.—Cases, 20 cwt. stow in 78 feet. Bags, 20 cwt. should stow in 75 feet. (*See* **Fruit.**)

OPIUM.—This drug is mentioned by Pyres, a writer in the early part of the sixteenth century, as a product of the Kingdom of Cooch Behar, in Bengal, and Malwa. Its introduction into China is ascribed to the Arabs, during the reign of Taitsu, 1280-1296. Long before the Indian drug was exported to China the indigenous product was largely consumed there.

In India the spread of Islam appears to have been connected with the cultivation of the poppy, which is mentioned as a staple crop in some of the writings of the sixteenth century, and we know that during the ascendancy of the Moguls the manufacture of opium was an Imperial monopoly, farmed out year by year at a just rent. This monopoly seems to have fallen into abeyance with the decline of the Mogul power, and we find the trade in the early part of the eighteenth century unrestricted and in the hands of a body of native merchants at Patna, who advanced money to the ryots of Behar for the cultivation of the plant and the produce therefrom, selling the latter for export to the local representative of the different European trading companies. The history of the traffic during the following fifty or sixty years is a series of violent fluctuations, the tendency of which appears to have been towards the adulteration of the drug, and its deterioration in the market. The trade became, in fact, thoroughly disorganised, and after the English had, through the victory of Clive at Plassey, gained the sovereignty of Bengal, the problem was solved and all difficulties put an end to by Warren Hastings, who, in 1773, as Governor of Bengal, revived the monopoly and assumed it on behalf of the East India Company.

The revenue derived from the opium exported from India is levied in two ways. In Bengal the drug is manufactured in state factories from the poppy cultivated under the supervision of the Government and it is eventually sold at Calcutta on account of the State to merchants who export it chiefly to China. On the other side of India, however, opium is produced by private enterprise, from plants grown in native states, and the revenue is raised by means of an export duty levied upon it by the Government.

China is *not* dependent upon India for the supply of the drug consumed by the masses in that country; a single province of the Celestial Empire produces annually more opium, although of an inferior quality, than the whole of India in the most prosperous of seasons. India, however, places in the market the luxury of a superior and expensive article which is much appreciated, and purchased by the richer classes through the usual commercial channels.

The balls or lumps of opium are packed in lined cases covered with gunnie, carefully marked and numbered on the outside. The greatest care should be taken both in receiving, stowing, and delivering this article; it is decidedly one of the most valuable that seamen have to deal with. Each case should be duly examined, the outside covering, seals, marks and numbers, etc., noted down in a tally book.

If the seals are not intact the contents have probably been tampered with, in which case the packages should be returned to the shipper at once. A careful tally should be taken by an officer in charge of the hatch, and another officer or responsible person should be in the hold with the cases while the coolies are working there. Natives abroad will broach and steal the opium if they get the least opportunity of doing so unobserved.

Vessels carrying opium between the Persian Gulf and China are liable to be seized and charged a royalty or duty if they call at an Indian port *en route*. Opium cannot be taken *via* such ports without payment of the usual dues, which are very heavy. Masters with even a chest of opium on board should make full enquiries before entering any Indian port, even for coal or provisions, whilst working to China.

Chests of Opium 3 ft. 1 in. by 2 ft. 3 ins. by 1 ft. 3 ins. measure 8 ft. 8 ins. and weigh 208 lbs. each. 20 cwt. should stow in 96 feet. Freight usually at per chest.

ORCHILLA WEED.—Shipped in bales of various sizes and weight. Damp or moist goods will damage this article.

ORES.—Ships loading cargo of this nature often have properly constructed trunkways, which relieve any undue pressure below, and tend to make the vessel easy in a seaway. The bulk of weight should in all cases be kept amidships.

The SS. "ORINGHAM," 1,321 tons net register, loaded 2,600 tons of ore at Benisaf, Mediterranean. The stuff resembled dark heavy sand. The holds were protected as for grain cargoes in bulk. Captain Thomas says: "I put about 200 tons in No. 1 hold, 400 in No. 4, and the balance was then piled up in Nos. 2 and 3. The vessel was fitted with shifting boards, but no trunkway or platform. She was loaded to her marks, and proved easy in a seaway."

Spanish and American ores are heavier than Mediterranean, and should be kept higher in the middle if possible. Some ores are said to be liable to spontaneous combustion. Articles of a dry and perishable nature should not be stowed near ores likely to damage them.

Silver ore is generally packed in bags of from 90 to 100 lbs. each. It is also carried in bulk from Port Pirie, Australia.

ORRIS ROOT.—20 cwt. stows in 80 feet.

OYSTERS.—Shipped in bags and barrels weighing about 263 lbs. and measuring about 6 ft. 6 ins. each. They should be carried in a cool part of the ship, or on the upper deck in the open air if possible,

and looked upon as perishable articles. They should never be stowed among dry goods.

10 barrels of oysters, one ton (20 cwt.), stow in about 60 feet.

PADDY.—Rice with the husk on, as it comes from the paddy fields. (*See* **Rice.**)

PAINTS.—Tins or kegs containing paints should receive much care and attention in stowing on end, being easily damaged by other goods in bad weather at sea. When any quantity is to be carried a space should be set apart in the between decks, and each height should be well blocked off to prevent it shifting. Articles of this kind stowed among general cargo should not be subject to outside pressure, or the heads will burst, and the contents be lost or damaged.

20 cwt. of lead paint, in tins, should stow in about 16 feet.

20 cwt. of lead paint, in kegs, stow in 20 feet.

20 cwt. of oxide and other sorts, in tins, should stow in 16 feet.

20 cwt. of zinc-white stow in 16 feet.

White Lead in tins of 28 lbs. each, 80 tins equal one ton weight, measured on deck 26 ins. by 32 ins. by 32 ins., stowed in 15 ft. 5 ins.

Red oxide, and green paint, 20 cwt. stow in 16 ft. 10 ins.

PALMLEAF FANS.—In cases, 7 to 10 feet. To be kept dry.

PAPER.—Over fifty kinds of bark besides wood-pulp, rags, and grass are now used in the manufacture of paper. Even banana skins, pea-haulm, cocoa-nut fibre, hay, straw, weeds, leaves, shavings, corn-husks, and hop-bine are used for the same purpose. (*See* **Books.**)

Paper, in rolls, shipped to Bombay from Liverpool. One roll 27 ins. by 20 ins. by 20 ins. = 6 ft. 3 ins., weight 117 lbs.

20 cwt. stow in 120 feet.

PATCHOULI.—A perennial herb found in the East and from which a powerful scent is extracted. The odour is pungent, causing damage to articles such as tea, flour, etc., when stowed near.

PEAS.—In bags, 20 cwt. stow in 50 feet. (*See* **Grain.**)

PEA-NUTS.—In bags weighing about 105 lbs., and measuring 7 ft. 6 ins. each.

PEPPER, Pimento, Allspice, Jamaica Pepper, etc.—From ancient writers we learn that pepper was held in high esteem, and for a long time was considered one of the most costly of spices. At present it is a necessary of daily use and forms a valuable article of commerce. The term pepper is applied to numerous vegetable products, such as bird pepper, bell pepper, etc. The most important, however, is that which yields the household condiment.

Pepper sweats very much at times and gives off pungent fumes; it should therefore be kept well ventilated. It should be stowed with dry articles, but not amongst such as would be damaged by contact with it.

When loading or discharging single bags, not more than six should be put in a sling at one time, or they will burst, and the damage and loss fall on the ship.

It is generally shipped in double bags of 100 lbs. each.

20 cwt. in bags stow in about 80 feet.

PEPPERMINT.—Cases weigh 79 lbs., measure 3 ft. 2 ins. each. One ton, 20 cwt., stows in about 70 cubic feet.

PEPPERMINT FLOUR.—From China. Put up in tins or bottles packed in wooden cases measuring 7 to 8 cubic feet. Weight half-picul net. Value, from $300 to $700 per picul. Stowage required in a cool dry place, being melted by heat.

PERFUMERY.—The ordinary perfumes of commerce are sundry bouquets or mixed scents prepared by compounding various essences, or essential oils, etc. Packed in small cases, which require to be carefully stowed in a safe place.

Average weight of 40 cases was 329 lbs., and measured 11 ft. 4 ins. each.

20 cwt. should stow in 80 feet (uncertain). (*See* **Essential Oils.**)

PETROLEUM.—A brown liquid bitumen found in many parts of the world, and, when refined, used for lighting and other purposes. It is a question whether the demand for this article will not eventually exceed the supply. Within recent years it has been brought into daily use by almost all nations in the world. In 1909 the United States produced about 7,500,000,000 gallons, and Russia about 4,000,000,000, these being the largest oil-producing countries.

The petroleum trade of the world of late years has been characterised by a great development of the system of transport in bulk, and by the introduction of tank vessels, built and fitted expre sly for the trade. Sailors are now called upon to carry thousands of tons across the ocean in one shipment, and, as much has yet to be learned in regard to the business, it is highly necessary that every precaution that experience and common sense can dictate should be brought to bear in warding off and reducing the dangers incidental to the traffic.

That there is a serious element of risk in transporting such an inflammable article is a fact that has made itself apparent from time to time by terrible disasters and loss of life.

The odour from oils of this nature will damage any article liable to be impregnated by it. Vessels should be thoroughly disinfected before taking in other cargoes.

Sailing vessels carry about 6¼ round barrels, or say 8 payable barrels of 40 American gallons to the net ton register.

Case Oil.—Sailing ships should carry, of China and Japan cases, about 39 to the register ton; of Java cases, say about 32 to 35 per ton register. Each case contains two tins of 5 American gallons each.

RULES FOR STOWAGE OF PETROLEUM IN AMERICAN PORTS.

Owners, masters, or agents of vessels loading Petroleum and its products are required to observe the following rules in preparing and loading their vessels in order to obtain a certificate from the Surveyors appointed by the Board of Marine Underwriters:—

1st.—Vessels with cabin or forecastle entirely under deck will not be permitted to load naphtha, benzine, or spirits of petroleum under inspection.

2nd.—*Ballast* must be of stone, shingle, or dross. All vessels intended to load petroleum, and before taking in any oil, must be sufficiently stiff to change berths in all kinds of weather when tugs can safely tow them. Ballast of any description must be covered with boards, and the barrels kept clear in the wings, or where ballast is trimmed against them, by boards or planks.

3rd.—*Stowage*.—All barrels and cases must be stowed in straight tiers, fore-and-aft; in no case will it be permitted to stow with the sheer of the vessels (rounded off); all breakages must be made perfectly solid with ballast (cased in) or suitable dunnage wood; no hanging beds will be permitted under any circumstances; the barrels must be stowed bilge-and-cantline, and every barrel properly bedded and well chocked. In the ground tier, each barrel must rest on two soft wood beds, of about 2 in. thickness, placed by the quarter hoops, leaving the bilge of the barrel about one inch free. No barrels to be stowed athwartship without special permission of the Inspector, and in no case will it be permitted where the barrel is subject to any pressure.

4th.—*Single deck with lower beams*.—Single deck vessels with between-deck beams not more than 8 feet apart from centre to centre taking six heights of barrels, must lay a temporary between-deck, with 3-inch planks, not less than 9 inches in width, directly under the bilge of the barrels fore-and-aft; planks to be securely blocked from side to side; if the beams are closer than 8 feet, then 2 or 2½ inches, laid close together on the beams, may be used, to be secured from side to side. Where the beams are further apart than 8 feet, heavier materials in proportion must be used, all to be regulated by the Inspector. A stanchion, well secured at both ends, must be under each between-deck beam. Vessels with between-deck beams, if over 13 feet hold, loading oil in cases, will also be required to lay a between-deck of planks as above.

5th.—*Ventilation*.—All vessels loading barrels, or cases, especially those containing crude oil, benzine, gasoline, naphtha, or spirits of petroleum, must be ventilated through the hatches, unless already fitted with suitable permanent ventilators, fore-and-aft, to be approved by the Inspector. (*See* **Naphtha, etc.**)

The steamer "FERGUSONS," of Middlesbrough, built at Sunderland in 1880 as a single-deck vessel, but with one tier of beams, registered tonnage 973 tons. In 1885 her owners determined to devote her to the petroleum trade, and accordingly 32 fixed tanks were fitted in her holds, in addition to 4 regulating tanks. There was a gangway between the tanks to enable a man to pass between and attend to the cocks. All the tanks were connected with each other by means of pipes and cocks, and the oil was discharged through pipes leading from the tanks into a general discharge pipe. They were filled and emptied by means of two donkey-pumps placed on the upper deck, one just forward of the bridge and the other of the poop, the steam for these engines being supplied from the main boilers, for they could not be supplied from the shore. There were man-holes in each tank, and ventilators appear to have been fitted to both holds. The vessel was lighted throughout by electricity, there being 28 fixed Edison-Swan incandescent lamps of 16 to 20 candle-power each and 11 stations in the ship.

At Batoum the vessel loaded a cargo of distilled oil, and proceeded with it to Trieste, where it was discharged. The tanks were then cleaned out, and she proceeded in ballast to Philadelphia. At Philadelphia the vessel loaded a cargo of crude petroleum for Rouen, this being the first time she had taken a cargo of this description. No fires except the stokehold and galley were allowed during the

voyage, and eventually she arrived safely at Rouen. During the voyage the vapour from the oil was described by the chief officer as being so powerful that it made him feel sick and dizzy, and that five or six minutes was the longest time he could remain in the hold, notwithstanding that the ventilators were open and the man-hole covers off the hatches nearly the whole of the voyage. He also stated that there were signs of weeping and leaking from some of the tanks. The vessel commenced to discharge at Rouen on the 14th December, 1887, steam being supplied from the shore for the donkey engines and dynamo, and no fires, naked lights, or smoking were allowed on board during the discharge. While the tanks were being discharged it was necessary to constantly use the portable lamps in the holds, to examine the suction pumps, etc.

On the 17th, the third engineer, having been ordered to inspect the fore-bilge, went down into the fore-hold and found the portable lamp disconnected. He therefore got the tankman to connect one of them, and, while this was being done, noticed that a spark was emitted directly the unprotected wires were moved or came in contact. He reported this to the chief engineer, stating that the lamps were dangerous and emitted sparks, but nothing was done to remedy the defect.

On the morning of the 19th it was a dead calm and the vessel was pumped out fore and aft. Scholar, the tankman, was in charge of the holds, assisted by an A.B. named Wallace, who was described as strictly sober, steady, and a non-smoker. About 10.20 or 10.25 Wallace came on board wearing his sea boots, which were very muddy, and descended through the manhole into the tank just forward of the mainmast. His duty was chiefly to open and shut the cocks in the suction pipes by which the oil was pumped out. Scholar came out of the hold a few minutes afterwards and was walking forward, the third engineer with several of his men were at work in the engine room and on the boilers, the chief engineer was standing by the engine room companion, the chief officer was on the lower bridge deck, and the steward was in the after part of the cabin, when an explosion took place. The chief engineer and chief officer were blown about six yards along the deck, but, although considerably injured, they contrived to scramble on to the quay. The steward managed to escape through the skylight, but was severely burned in so doing. The after-hold and cabin were on fire, the mainmast gone, and the deck blown up; the after bulkhead of the engine room was blown in; in fact the after part of the ship was a complete

wreck. The fire proceeded forward, and at about 11.45 another terrific explosion took place in the fore-hold and the ship was then completely wrecked. The fire continued to burn for several hours, although every effort was made by the fire brigade to extinguish it. Wallace was never seen again.

Experiments made by Dr. Dupré with a sample of the crude American petroleum (as obtained from the tanks at Rouen) showed that one volume of the oil rendered 2,400 volumes of the air inflammable, or feebly explosive. This mixture of air and vapour can be set fire to by an electric spark, by a flame, or by any solid at a bright red heat. One gallon of oil in a confined space will, if of the character of that sample, render 400 cubic feet of air inflammable. This cargo was one, therefore, liable to give off vapours of a dangerous nature.

For oil of this character in bulk, ventilation should be at the rate of about 120 cubic feet per hour for every square foot of exposed surface of oil, and that rate ought to be maintained as long as any work in the tank is necessary. There seems to be no doubt that, looking at the highly dangerous manner in which the portable lamps were connected as makeshift, a spark was generated in this inflammable atmosphere and the explosion followed.

It might perhaps be advisable to relate another case, that of the "WILD FLOWER," a steamer specially built for the trade at Sunderland in 1889, her net tonnage being 1,745. She had six cargo and five water-ballast tanks, the former capable of holding 2,512 tons and the latter 315 tons. The last cargo was crude petroleum, shipped at Philadelphia and discharged at Rouen. The tanks were pumped out as far as possible until the pumps ceased drawing. When the vessel left Rouen for the Wear, on the 4th of January, 1890, there was left in No. 1 tank about 6½ inches, in No. 2 tank about 2 inches, in No. 3 tank about 1 inch, in No. 4 tank about 5 inches. On the 8th January, 1890, the vessel was moored at the buoys off the Manor Quay, on the north side of the Wear, with her head up stream. The master gave directions to the chief engineer to straighten the ship, which had a list to port, leaving it to his (the engineer's) discretion as to the draining of the tanks. He then went on shore. By the direction of the chief engineer, pumping commenced at 9.30 a.m.

When water is pumped into tanks containing this class of oil, the oil, being lighter than the water, would float upon the top and

accordingly would be the last liquid that the pumps would eject from the tanks. It appears that pumping had been going on for some time, the oil floating on the surface of the water for some little distance around, but collecting especially in the bight near the North Ferry landing. In the vicinity were moored the steamers "DOUGLAS," "DERONDA," and "PARKFIELD" (new), also the tug "EARL OF DUMFRIES" and a lighter. On board the "DERONDA" and "PARKFIELD" riveting was going on, and portable forges were being used on the decks of both vessels. It is supposed that a burning piece of oily waste, or a red-hot rivet, thrown overboard from one of these vessels may have set fire to the oil on the surface of the water. At any rate, at 11.45 the master of the ferry-boat in passing under the bows of the "PARKFIELD" observed a small body of smoke and flame, about the size of an ordinary household fire, upon the surface of the water, not more than four or five feet from the starboard side of the "PARKFIELD." The area of the fire at once extended, the flames rushed up into the air and swept by the quarter of the "PARKFIELD," attacking the lighter, and, rising to a great height, rushed over the bows of the "DERONDA." The tug "EARL OF DUMFRIES," was then enveloped and the flames passed on to the "DOUGLAS" and then to the "WILD FLOWER," and here burned so fiercely that 27 plates were badly buckled, and had to be removed. Some of the men employed on the "DERONDA" dropped into a boat and escaped to a raft lying close to the quay, but two boiler-smiths were left hanging on to a rope over the port quarter. A boat was sent to take these two men off, but the flames sweeping round the vessel's stern enveloped the boat, forcing the men to jump overboard. They all managed to gain the raft with the exception of one of the boiler-smiths, who drifted outwards from the vessel into a mass of flame and sank. When his body was recovered it was found that his face was much burnt. The fire was extinguished by one o'clock, partly by burning itself out, and partly by water played upon it by various engines.

From the evidence of Dr. Dupré, it appears that when poured on the water this oil spreads rapidly, one gallon almost immediately covering rather more than two square yards, when the film has a thickness of one-sixteenth of an inch, and this will readily take fire either by a match, electric spark, or a red-hot rivet. It, however, continues spreading, and as it becomes thinner will not ignite easily except another body of burning oil meets it, when it will burn up and spread rapidly.

Whatever may have been the cause of the outbreak, it is, as the

Inspector points out, "manifest that the practice of emptying tanks which have been laden with crude petroleum into harbours or places in which there is shipping is an exceedingly dangerous one." The bye-laws of the River Wear Commissioners did not appear to contemplate the discharging of petroleum cargoes in bulk, the regulations only referring to barrels, or similar cases containing petroleum. Masters and officers of "tank" steamers have to undertake serious risk in transporting petroleum in bulk, but this experience of the "WILD FLOWER" at Sunderland shows that even when they have got the oil outside the ship their responsibilities are not ended, for, unless they take care how they dispose of the residue of the fiery fluid, fatal accidents may happen.

Regulations for vessels laden with Petroleum in the Suez Canal:—

1. In order that vessels laden with Petroleum in bulk shall be readily distinguished and avoided, when passing through the Suez Canal they will show at the mizzen mast the following distinguishing signals:—

By day—A red flag above one ball.

By night—A *white* light between two *red* lights.

2. When such vessels make any stay in port, they will be isolated by means of floating booms.

PHOSPHATE OF LIME.—In bags which are often rotten and discoloured; it should not be stowed among articles of value or liable to damage. Bags average about 176 lbs. 20 cwt. stow in 42 feet.

PHOSPHORUS.—Considered very dangerous and consequently should not be carried as cargo, excepting under special arrangements.

PINES, or Preserved Pine Apples.—In tins and cases. Stow as dry goods. West Indian cases, containing 1 doz. 3 lb. tins, weighed 38 lbs. and measured 1 foot each.

Singapore cases weighed 77 lbs., measured 1 ft. 9 ins. each.

20 cwt., tins in cases, should stow in 60 feet.

PINE APPLES.—*See* **Bananas.**

PINE SEEDS.—Packed in cases. 20 cwt. stow in about 60 feet.

PITCH.—The residuum of boiling tar. Usually packed in barrels or kegs. Asphalt, bitumen, and other varieties of tar and pitch, may be classed under one heading so far as stowage and transport are concerned. It is an inflammable article, and will run

if subject to any great heat. The melting of pitch on board ship for caulking or other purposes is strictly prohibited in most ports. (*See* **Tar.**)

Barrels of pitch, each 460 lbs. 20 cwt. stow in 45 feet.

PLANKS, Deals, Boards, etc.—*See* **Wood and Timber.**

PLANTS, SHRUBS, etc.—In cases, are usually carried on deck at special rates.

PLASTER OF PARIS, or GYPSUM.—A soft white powder, which when mixed with water forms the paste called "plaster of Paris." It will, when dry, absorb ammonia from chloride of lime, manures, etc.; must always be stowed in a dry place.

PLUMBAGO.—Generally shipped in casks, which invariably cause the ship extra expense when discharging, for coopering, etc. This article should not be stowed among other goods. (*See* **Black Lead.**)

In casks, 20 cwt. stow in 47 feet.

POONAC.—A cocoa-nut oilcake used to feed animals. It is somewhat similar to linseed cake.

20 cwt. stow in about 80 feet.

POPPY SEED.—A small white seed which requires strong, tight packages to contain it. A fine oil is made from this seed, also oil-cake. It has no narcotic property, such as opium, or that the juice of the poppy plant possesses. 20 cwt. stow in 70 feet.

POTATOES.—Full cargoes require care and also plenty of ventilation. Before loading have the holds cleaned out and well dried, and if possible dusted over with lime. Potatoes stowed in the same hold with general cargo often damage it. They will lose weight during the passage, therefore provide against at least 10 to 15 per cent. shortage, otherwise the ship may be liable. For ship's own use, as stores, they can be kept for months in good condition by throwing over every 25 bushels one quart of air-slaked lime, picking them over every now and then, and rubbing off the sprouts.

Bags weigh 156 lbs. each. 20 cwt. should stow in 55 feet.

Barrels weigh about 200 lbs., measure 6 ft. 8 ins.

PRATIQUE is the word used to indicate Quarantine inspection or law. It is usual to hoist the *yellow flag* entering a port abroad, in order to indicate to the medical authorities that the vessel desires to have free pratique, or submit her Bills of Health, etc., for inspection. (*See* **Quarantine.**)

PRESERVES.—Shipped from China packed in *cases* of 6 jars, measure 1 ft. 6 ins.; in cases of 12 jars, measure 3 feet. Special stowage required. Value $2.20 to $5 per case.

Packed in *casks*, 3 to 4 feet measurement. Weight one picul net. Value $18 per picul. (*See* **Ginger.**)

PRESERVED MEATS, etc.—Cases containing Canned Meats average alongside:—

One case weighed 32 lbs., measured 6 ins. by 11 ins. by 16 ins., equal 7 ins.

One case weighed 60 lbs., measured 11 ins. by 11 ins. by 16 ins., equal 1 ft. 1 in.

One case weighed 97 lbs., measured 12 ins. by 16 ins. by 19 ins., equal 2 ft. 1 in.

One case weighed 113 lbs., measured 13 ins. by 17 ins. by 18 ins., equal 2 ft. 4 ins.

Boxes containing Preserved Oysters, etc.:—

One box containing 4 doz. tins weighed 58 lbs., measured 1 ft. 3 ins.

One box containing 4 doz. tins weighed 60 lbs., measured 1 ft. 4 ins.

The tins containing preserved meats, etc., sometimes turn out damaged by rust, and cause expense to the ship. (*See* **Condensed Milk.**)

PROTEST.—In all cases, if possible within 24 hours of a ship's arrival at her port of destination, the master should go before a Notary Public, or in a foreign port to the Consul, and note a protest against wind and weather.

PROVISIONS.—*See* **Stores.**

PRUNES.—Dried, in casks, 20 cwt. should stow in 52 feet.

PUTCHUCK, Putch Leaves.—Packed in bales. The smell from this article is injurious to many other things, especially flour, tea, flake, tapioca, sago, etc. (*See* **Patchouli.**)

QUARANTINE.—Quarantine is of two kinds, viz., *observation* and *strict*. There are certain articles of merchandise coming from an infected port which are quite sure to be subjected to quarantine, or purifying processes, before being allowed to land, viz., rags, waste paper, hair, leather, skins, feathers, wool, old clothes and wearing apparel generally, etc. The Consul at the port of loading should certify, on the back of the Bills of Health, what part of the cargo had been received on board in free pratique, or whether it had been

received from the quarantine station, or transhipped from any other vessel direct. (*See* **Bills of Health.**)

QUEBRACHE WOOD.—Shipped from the Argentine in logs, and although very heavy, about 33 feet to the ton, it is so crooked that it takes about 60 feet to the ton for stowing.

QUICKSILVER.—Mercury is the heaviest of all fluids. One iron bottle weighed 75 lbs., measured 14 ins. by 6 ins. by 6 ins. 875 lbs. equal 1 cubic foot.

RAGS, and SHODDY.—Shipped in bales and bundles. Should never be stowed near oil or greasy articles, being liable to spontaneous combustion. The objection to such articles is that they are supposed to convey contagion and vermin from port to port. This can, of course, be provided against by a thorough system of disinfection, or heating to a high temperature will destroy any objectionable qualities. When this is done there is nothing that requires more than ordinary care. In stowing, owing to the liability to spontaneous combustion, it is always advisable to keep such goods as near the hatchways as possible. During the prevalence of cholera, plague or other epidemics abroad, rags should not be received as cargo without enquiries being made as to liability at port of discharge, otherwise the vessel may have to undergo extra quarantine and expense before getting rid of such goods. In Italian and Spanish or other foreign ports it is especially liable to cause trouble.

RAILWAY MATERIAL should, as soon as possible, be carefully examined by the officer or engineer of the ship when it arrives alongside previous to shipment; should any flaw or injury, however slight, be detected it should at once be pointed out, and noted in the receipt and B.L. In the East a very unfair custom prevails among railway consignees of having all goods landed and afterwards examined, instead of granting a receipt as it leaves the ship, where the ship owners' liability should cease.

Wagon-Work varies much in relative weight and measurement.
,, *e.g.* 432 tons weight, measured 785 tons of 40 feet.
,, ,, 149 tons weight, measured 361 tons of 40 feet.
,, ,, 106 tons weight, measured 279 tons of 40 feet.
,, ,, 270 tons weight, measured 441 tons of 40 feet.
,, ,, 160 tons weight, measured 230 tons of 40 feet.
,, *Packages* weighed 160 tons, measured 220 tons of 40 feet.

Wagons (Tipping).—20 weighed 5 tons 16 cwt. 2 qrs., measured 689 cubic feet.
,, ,, 24 packages weighed 3 tons 18 cwt., measured 569 cubic feet.

Locomotives (complete) measure about twice and a half times their weight; thus, one weighing 28 tons 19 cwt. 14 lbs. measured 71 tons (of 40 cubic feet) and 18 ft. 10 ins., or 2,868 ft. 10 ins.
Boiler and frame, 11 tons 1 cwt. 2 qrs., measured 1,156 ft. 1 in.
Tank and frame connected, 4 tons 2 cwt., measured 653 feet.

Locomotive shipped for the Bengal and Nagpur Railway Co. consisted of 34 large parcels, including engine and tender, total weight 72 tons 19 cwt. 3 qrs.

RAIN-WATER GOODS.—Sometimes packed in cases or casks, but are mostly carried loose. The best mode of stowing is on end, but this is only practicable when the 'tween decks of vessels are specially fitted for the purpose with movable fittings.
20 cwt. should stow in 68 feet.

RAMIE.—Ramie is a grass peculiar to Borneo and parts of the Malay Peninsula. It is noted for its strong fibrous stem, which, when decorticated, produces a superior kind of flax, of a silky appearance. This material is capable of being spun into strong, fine linens, supposed to be equal to and much cheaper than anything of the kind yet produced.
Shipped in bales like hemp.

RAPE SEED is produced in almost every part of Europe, but that in the eastern portions, as Hungary and the Black Sea districts, is usually very inferior, and goes by the name of wild rape seed. East India seed is shipped in bags; European seed generally in bulk. The finest rape seed is produced in Holland, Belgium, and Germany. Much of it is crushed on the spot, but cargoes are often sent to England. If new it is liable to heat, consequently should have plenty of ventilation.
20 cwt. stow in about 61 feet. (*See* **Hemp.**)

RATS, VERMIN, etc.—The British shipowner is *prima facie* responsible for damage to cargo on board his vessel by vermin. This is a loss not peculiar to navigation only, but to articles on land in warehouses, stores, etc. The presence of cats, dogs, or other precautions to prevent injury from rats is often insufficient to remove liability. It is necessary, however, in all cases for the shipmaster to show that he has protected his owners' interest by exercising every

precaution to guard against damage by " vermin." Bills of Lading should always contain the vermin clause.

An iron plate on upper part of mooring cables prevents access from the water by rats.

Bait for Rats. An interesting, not to say valuable, discovery has been made by Captain Weedin, in charge of the animals at the Zoo. The building is infested by rats, and how to get rid of them has long been a perplexing question. Traps were used, but nothing would tempt the rodents to enter. In a store-room drawer was placed a quantity of sunflower-seeds used as a food for some of the birds. Into this drawer the rats gnawed their way, a fact which led the captain to experiment with them for bait in the traps. The result was that the rats could not be kept out. A trap was found some mornings to hold fifteen. They were turned into cages containing weasels and minks. The latter will kill a rat absolutely almost before one can see it, so rapid are its movements. The weasels are a trifle slower, but none of the rats escape them. (Washington Corr., " Cincinnati Commercial.")

RAT TRAPS.—Packed in casks, 2 ft. 4 ins. by 2 ft. 4 ins. by 3 ft. equal to 16 ft. 4 ins., weigh about 507 lbs. each.

20 cwt. stow in about 75 feet.

RATTANS, or RATTAN CANES.—Rattans are the long, flexible stems of the genus *Calamus*, chiefly found in the East Indies. On an average, in their ripe state they vary from 100 to 500 feet in length. In countries where the rattan grows the inhabitants make use of them for a great variety of purposes. Not only do they furnish the interior of their homes with articles of daily use, but country vessels are rigged, moored, and fitted with ropes and lines made from this reed. It holds aloft the graceful suspension bridges over otherwise impassable rivers, and hauls the trunks of fallen trees to market. European nations use it chiefly for chair-bottoms, couches, window-blinds, and other domestic purposes. On its way to market, in ships, sailors use it for dunnage and broken stowage. When skilfully placed it is of considerable value, especially down the sides and between decks of vessels where moisture accumulates. Full cargoes of rattans are often carried by small vessels, and they require ballast for stiffening purposes.

RATTAN SHAVINGS.—Packed in bales 6 to 7 ft., weigh 133 lbs. each.

RECEIPTS.—It is the custom for the mate to give Receipts for Goods when tendered for shipment ; but the mate being responsible

for tally, and the correct delivery of the cargo, should never give a receipt until the goods are actually on board. He cannot be compelled to give a receipt for goods alongside ; if he does so he may render himself liable to a criminal indictment, should Bills of Lading be obtained on his receipts and fraud be practised. If the mate gives receipts for goods, or accepts the custody of them whilst they are in the lighter, on the quay or wharf, the master and owners of the vessel are responsible for any loss or damage which may happen to the goods before they are actually placed on board the vessel.

Mates' receipts are, in fact, negotiable documents, and may pass from hand to hand. A B.L. granted without production of the mate's receipt would undoubtedly lead the shipowner into serious trouble, should it be afterwards produced and B.L. be called for in exchange.

When a receipt has once been given for goods on board, the master ought to be most careful not to sign or deliver any Bill of Lading without receiving in exchange such receipt, otherwise he might place himself and his owners under a two-fold responsibility : in the first place to the shipper in case he should require the goods to be delivered to his own order, having a legal right to do so, and secondly to the holder of the Bill of Lading, who might have been induced to purchase, or advance money, on the good faith of such bills.

In granting a receipt for goods it is very necessary to keep a counterfoil or copy on board, not only for reference in case of dispute, but also as a means of checking the manifest before entering a port.

Shippers abroad sometimes make out boat-notes in the form of receipts, and expect the mate or others on board to sign and return them to the boatman. This is a most objectionable practice, and a fruitful source of trouble to the ship. Receipts should never be given for cargo or packages, excepting on the ship's or company's form ; they should clearly and distinctly state the purpose for which they are given, with the marks, numbers, and quantity written in full, not in figures. It is not sufficient to state " packages in bad order," which may mean anything or nothing ; state exactly what the damage is.

REDWOOD.—A heavy wood sometimes used for dunnage. Being crooked, it is ill adapted for good stowage.

REGULUS.—*See* **Ores.**

RESIDUUM.—45 to 48 gallons gross in a barrel ; weighs 7½ lbs. per gallon ; barrel itself weighs about 60 lbs. ; gross weight about 420 lbs.

RESIN, or ROSIN.—A substance obtained from the distillation of turpentine. Resin, a vegetable substance exuding from certain trees, inflammable, and hard when cool, viscid when heated, insoluble in water, but soluble in alcohol. Packed in kegs or barrels. Should not be stowed among other goods, but kept separate and, if possible, in a cool place.

New York barrels weigh 340 lbs. to 426 lbs. each, measure 9 ft. 6 ins. to 11 feet each.

20 cwt. in barrels should stow in 58 feet.

RETORTS.—Fire-clay retorts, 20 cwt. stow in 50 feet. 8c retorts weighed 31 tons, and measured 1,464 cubic feet.

RHEA FIBRE.—This is one of the best fibres produced by the vegetable kingdom. It is soft and fine, with a beautiful silky gloss and remarkably strong. The exquisite textures known as China grass cloth are made from it. It is, however, difficult to prepare and consequently the consumption remains at a limited scale.

In Calcutta 5 bales go to a ton.

20 cwt. should stow in 60 feet.

RHUBARB and other Roots.—Roots of plants well dried may be stowed with dry articles.

Powdered, in bags, 20 cwt. stow in 104 feet.

RICE.—The stowage of rice is much the same as that of other cereals, but more attention is required in the ventilation of the holds. Bags should be well protected from the sides and ironwork of the vessel, otherwise they may rot and damage. A free course of at least 1½ inches down the lining of the ship should be ensured for the sweat to run free of the cargo, and for air to circulate. Rice is shipped as weight by steamers from Calcutta and other ports.

When carried among general goods it should not be brought in contact with badly dried skins, horns, saltpetre, or other articles liable to damage by smell or contact. Hides stowed in the same hold should be free from smell or moisture.

Captain J. McKirdy says :—Rice exported from Rangoon is grown in the districts intersected by the Irrawaddy and its tributaries, the paddy being mostly brought down in native boats. It is sold to the highest bidder, then milled to suit the market for which it is destined, and shipped off.

The season generally commences about the 15th or 17th January, and work goes on incessantly, milling and loading up to about the 15th April, about which date the hardest of the work may be said to

be past, and the mills are then employed turning out white rice for the Continental markets.

The boats which bring the paddy down are placed alongside a mill, and a standard basket is passed in and filled, its contents levelled down with a stick, then emptied into a big basket and trotted off to the mill on the head of a coolie. The proprietor and broker keep tally, and on the boat being emptied the cash is paid down ; this goes on incessantly until all the boats are emptied.

After the paddy is husked, the husk is run into the river, and the rice is mixed with paddy in the proportions of 80 per cent. rice to 20 per cent. paddy, and is then bagged and stitched up preparatory to shipment.

A single thick gunny bag is all that is used, and when it is filled will turn the scale at 220 lbs. The name given to this mixture is cargo rice."

The reason why paddy is mixed with the rough rice is to keep the piles apart from each other, and thus secure better ventilation. Experience has proved that a bag of this " cargo rice " will reach home in much better order than a bag of pure rough rice would, more particularly at the beginning of the season, when the grain is comparatively soft.

A bag which leaves Rangoon for London, *via* the Suez Canal, weighing 220 lbs., will not turn out more than 216 lbs. at its destination.

When the cargo gets home it passes into the hands of the miller again, who runs it through the mill and husks all the paddy in it ; then it is put through again and again, until all the purplish cuticle which covers the kernel is removed. It is then polished and becomes the white rice we are accustomed to.

The refuse is worked up into various uses, as food for cattle, and bill stickers' paste ; what grains are broken in the milling are converted into starch, so that nothing is wasted which pays freight.

The master of a steamer arriving in Rangoon for a rice cargo, and with a day or two to spare, could not do better than make a careful inspection of his holds. If coal has been stowed in them and they want washing out, do it on the last of the ebb, for then the river water will be almost fresh.

Make a careful survey of all coal-bunker bulkheads, to see that there are no rivet-holes unfilled in them, as an empty one may be productive of much evil. A rice cargo gives off so much heat and moisture that the rush for the air-shafts and ventilators is naturally great ; a craving for air to supply the vacuum thus generated is con-

stantly going on in the hold, and I have known one case in which almost fifty bags of rice were classed "coal stained," all caused by one empty rivet-hole in a coal-bunker bulkhead.

See that there is not a drop of water left in any of the corners, or on top of the stringers, as rice is a most peculiar cargo to handle. Keep it dry, and it will not cost you one anxious thought, but get a little of it wet and decomposition sets in rapidly; a most intolerable stench is given off, which will search through every corner of the ship, and the paint-work will become blackened by the gases set free by it; besides, there is very great danger that fire from spontaneous combustion may be the sequel to wet bags. Heat is generated very quickly after rice and water have come in contact.

If the floors of your cabin, forecastle, and store-rooms are of wood, see that they are well caulked, so as to prevent as much as possible ingress from the damp and steamy air from the rice. If it does get access, not only will the health of all suffer, but your stores will go bad, and ropes and sails perish long before their time.

In dunnaging the bottom of the ship, whether with teak blocks, planks, or your own dunnage wood, keep it well apart for the sake of ventilation, and wherever you can thrust a stick of wood in betwixt iron and the mats, do it, as the air spaces left at the sides of the wood will all help to conduct the heat upwards. Bear in mind that the object to be aimed at in stowing a rice cargo is to induce all the heat of the holds to come up the hatches, air-shafts, and ventilators, when the temperature below does not differ much from that of the air on deck; but when cold weather sets in, use all endeavours to induce the steam to fly to the ship's side, where it will be speedily condensed, and run back into the bilges.

East of the Suez Canal, by keeping the hatches off and the ventilators trimmed, the heat ascends; west of the Canal great care is requisite. On warm, sunny days the hatches may be taken off with advantage; on cold, gloomy ones they are better on.

Put good mats and plenty of them in the bottom of the holds, as, no matter how carefully you take your rice in, some bags are sure to burst, and the mats at the bottom pick up all the loose rice, and prevent it ultimately getting into the bilges.

As to matting the sides, opinions differ. I think vertical sparring nailed to the fore-and-afters, with little or no matting, will be found the best, excepting at the edges of the upper wing tiers. These cannot be dispensed with, unless we can hit upon some sort of composition to coat the under side of the iron deck and stringers with, which will act as a non-conductor of heat.

The principal trouble with rice is that on getting into cold weather a quantity of the steam condenses on the under side of the iron deck and beams. This gradually gathers till it forms into great drops, the ship rolls, and the drops, still clinging to the iron, run down to leeward and fall off, some on to the ship's side, the rest on the bags and mats. Mats up in the sides soon get wet through and rotten if this continues long, and it generally happens that the bulk of the damage done to a ship's cargo is in the upper wing tiers, under the deck, and under the stringer plates.

I have tried folded blankets in one portion of the ship, but they were worse than the mats; they certainly sopped all the water up, but the bags beneath them drew the moisture all out of them. A wooden deck will not retain moisture like an iron one.

The system of loading a cargo in Rangoon is to lay down five heights of bags fore-and-aft the hold, parallel to the keel, and then, midway betwixt the centre line and the sides, to place wooden ventilators on edge (supplied by the shippers, as well as ventilator boards) at right angles to them, and about five paces apart; others are laid from side to side, intersecting the fore-and-aft ones, and all opening into each other; then vertical ones are placed, having their lower ends resting on top on one of the junctions, and their upper ends placed inside the ship's iron ventilators; others are placed at the four corners of all hatchways.

Then, up and down the midship stanchions, fore-and-aft the ship, ventilator boards are lashed, one on either side, and kept a little apart, so that when the ship is loaded you can stand in the upper hatchway and look down through the slit betwixt the boards to the keelson.

After the first tier of ventilators are in, work goes on again until another five tiers have been added, then come more ventilators, and so on till the ship is full.

Some of the rice shippers at their own expense mat the top of the bags fore and aft to prevent them getting soiled.

A bag with 220 lbs. of grain in it is bulky, and as they are pretty tightly filled it will settle down considerably; so much so, that although stowed close up to the beams in Rangoon, a small boy could crawl fore and aft the cargo in the Channel; therefore you will find that if your ship is carrying a press of sail coming across the North-East Monsoon, the cargo will settle to port, and if your coal is burned evenly off each side you will have a considerable list that way by the time you reach Aden.

The settling is most rapid the first week out, after that it gets

slower, and if you have light winds at the commencement of the voyage it may not amount to much afterwards.

I know one Steam Company which makes it a rule for each of its vessels to have a margin of 100 tons of coal above the estimated consumption to reach the various ports. The comfort conveyed to all on board must be incalculable, for with plenty of coal in the ship you can trim her any way you like.

What anxiety the man must have nearing home whose ship has a strong list to port, while a gale of wind is blowing on the starboard beam, and all the coal in the starboard bunker! If the ship were fitted with water-ballast tanks, of which the port and starboard ones were independent of each other, you could easily fill one on the weather side.

With a ship divided into three cargo compartments, two large and one small, and with four ventilators in each of the large ones, the heated air will always be found struggling to windward. Going head to wind, if the two foremost ventilators be turned with their mouths facing the wind and the two at the rear of the hold turned from it, heat will be found coming up the after ones; reverse the process, and you will be astonished at the rush which will come up the forward ones. In like manner, if the wind be off the starboard side, the heat will all cling to that side; this will be the more perceptible in cold weather, as you will find drops of sweat cling to the deck and beams on the weather side, while down to leeward will be dry.

Be very careful in taking off hatches in cold weather, as you are likely to do more harm than good. The moment the hatch is off a burst of heat comes up, but this is succeeded by a rush of cold air down, and if there has been any sweat gathering on the under side of the deck it will quickly develop into large drops and rain down on the cargo.

Frequently more harm is done the first day you begin to discharge in the docks than has been done all the voyage, for the sudden opening of all the hatches to get the cargo out lets in such a rush of cold air that sweat-drops form on every particle of iron within its influence.

Use every endeavour to prevent wet or damp bags coming on board. Boatmen are not over careful in handling buckets of drinking water. If through negligence a wet bag comes in, you will find it again on arrival home, and its position well defined by a ring of damaged bags round it. Shippers will only accept clean receipts, therefore you are at perfect liberty to reject any suspicious bags.

Towards the end of the season there is not so much risk of your

cargo heating, as the paddy, coming from distances far inland and arriving late, is much drier than that grown near at hand, and placed on the market soon after the harvest. Besides, a late cargo is often a mixed one, for when the first rush is past, and the mills only working regular time, quantities of "white rice" are made for the Continental markets, so that a cargo may consist of white rice, "coodie" or broken rice, "cargo rice," and rice meal. Coodie is the heaviest, white rice next, then cargo rice, and lastly the meal.

The average weight of a bag of rice varies according to quality. Some kinds are infested with weevils, which make their way into the ship's store-rooms, and also damage other articles of merchandise. The sweat from rice is often very great, consequently plenty of ventilation is necessary, especially in fresh cargoes.

A sailing ship is ventilated differently to a steamer. Having but one hold the small ventilators would not be sufficient. The system is, to stow in five heights fore-and-aft, then midway between the centre line and the other side, to strip out one row of bags from end to end, and at intervals single rows athwartship; this leaves broad, deep gutters, fore-and aft and across. These are bridged over with bits of wood, then more cargo is stowed in, until the next series of gutters is to be formed, and so on till the cargo is loaded; this secures good ventilation through the ship.

Some ships omit the athwartship gutters altogether. Great care is requisite in taking in the cargo, to sew up at once any bags that may burst, as loose rice getting into a gutter, or ventilators, will check the circulation of air, and hinder the clear ones from doing their duty as they ought.

If, through keeping your hatches off for ventilation, a spray should find its way to the bags, mark the wet ones before putting the hatches on; the first fine day get them up on deck, open them out, thoroughly dry the contents, and re-bag it.

In 1891 the SS. "HOLYROOD" loaded 3,720 tons of rice at Rangoon, and drew 23 ft. 7 ins. mean. She carried afterwards from Calcutta 3,800 tons of wheat on the same draught. (Register tonnage, 1,777; gross, 2,711.)

Captain G. G. Thomas, of the SS. "RESTITUTION," of Liverpool, 2,200 tons net register, carried 4,200 tons of rice from Bassein to Bremerhaven in 1890, and delivered the entire lot without a damaged bag. He recommended, instead of matting the sides of the ship, placing bamboos, lattice fashion, up and down; this has the extra

advantage of not only keeping the bags off the side, but of allowing a free current of air to pass along, and the sweat to drain off. In every third tier a small ventilating shaft was left fore-and-aft, and crossways amidships. Ventilating shafts, up and down from the bottom in each hatchway, were connected with those in the side, and thence carried to the top of the cargo ; this allowed a free current of air to pass fore-and-aft, and prevented the cargo from heating. The vessel was well supplied with deck ventilators, and the hatches were taken off in fine weather.

20 cwt. of rice should stow in 45 feet.

Bags of " cargo rice " weigh 220 lbs. each.

Rice with the husk on is called " paddy."

RICE BOWLS, and PLATES.—Generally packed away in casks weighing 7 cwt., and measuring 28 feet each.

20 cwt. stow in about 83 feet.

Plates measure about their own weight.

ROCKETS, and BLUE LIGHTS, etc.—*See* **Gunpowder.**

ROPE, etc. (Ship's Stores).—A ship may carry a complete set of spars and all necessary ropes, etc., as stores. Europe, manila, wire and hemp rope are generally shipped in coils, covered with tarred cloth. Stow in a dry part away from damp articles. The smell of rope will often damage tea, macaroni, flour, sugar, etc., if stowed near each other.

White manila is about 20 per cent., and coir about 50 per cent. lighter than tarred hemp rope, size for size.

Bundles of the old rope often average 165 lbs. each.

20 cwt. should stow in 135 feet.

RUM.—Exported from South America and the West Indies in puncheons, hogsheads, etc. Sugar and rum are often shipped together in the same hold.

The following is the method of stowage usually adopted by sailing vessels in the trade. To allow the free drainage of the molasses wooden spars are laid athwartships, and spars of lancewood fore-and-aft. The ground tier is commenced with a row along the keelson on both sides, fore-and-aft. Next place a row Burton-fashion behind these, and fill up with another row fore-and-aft. Second tier all fore-and-aft ; third tier, end up ; fourth tier, Burton form, the after part of the main hatch to the after part of the fore hatchway, and the rest fore-and-aft.

In the 'tween decks place the rum puncheons, all the wing casks Burton form, others fore-and-aft, with pimento or ginger on top.

All the casks (which must be bedded and chocked) should be bilge free and bungs up.

20 cwt. of rum in hogsheads stow in 70 feet.

20 cwt. of rum in bottles and cases stow in 66 feet.

RYE.—In bags, 20 cwt. stow in 58 feet. Stow as seed.

SAFFLOWER, or BASTARD SAFFRON.--A rather handsome annual herb, reaching 2 or 3 feet in height, cultivated in the East for its flowers and seed. The former are picked and pressed into cakes, then carefully dried. It is used as a dye, and sometimes to adulterate saffron, which is more valuable. From the seed a light yellow transparent oil is pressed which is supposed to be the principal ingredient of Macassar Oil. Packed in bales and boxes, and may be stowed as general cargo.

One ton of 20 cwt. stows in about 55 cubic feet.

One ton, roughly packed, stows in about 71 feet.

SAFFRON.—The dried orange-coloured bud of the *crocus sativus*. It is an article of considerable value, and should be carefully stowed.

20 cwt. requires 71 feet.

SAGO.—A variety of starch extracted from the cellular tissue of the sago palm (*Sagus Rumphii*). The inside or pith of the tree is scooped out and beaten in water to separate the starchy granules, which is used as food. To prepare the round pellets known in Europe, the starch is spread out and dried in the sun, then broken and pounded. It is usually packed in boxes, bags, or casks, and should only be stowed among dry goods, free from any decided odour. It is considered choice freight abroad.

Bags weigh about 112 lbs. each. Boxes about 200 lbs. each.

One ton of 20 cwt. stows in about 55 cubic feet.

SAL-AMMONIAC.—*See* **Ammonia.**

SALT.—Salt, in bulk, requires no dunnage, if the ceilings are high and say 18 inches off the bottom of the ship. Small vessels carrying cargoes of store salt require dunnage. Common salt stows heavier than table salt. A small vessel capable of carrying, say, 300 tons of the former will be full with 275 tons of the latter. The depreciation to be provided for in the B.L. to protect the ship should, for coasting voyages, be 5 per cent. ; foreign voyages, 5½ to 7 per cent. The evaporation caused by salt in a hold is great, and other goods of a perishable nature will often get damaged thereby. Casks of salt stowed in a general cargo will cause the articles next to become damp. It is considered that salt, like grain in bulk should have shifting

boards properly fitted. Care should be taken to stow this article away from iron, or any cargo likely to sustain damage by rust or damp.

In April, 1891, the SS. "HOLYROOD," Captain Reet, loaded 4,100 tons of common salt in Aden for Calcutta. The cargo was stowed without dunnage, but mats were used to cover all ironwork. She drew 23.7 mean, and had 300 tons of coal in the bunkers for ship's use. Subsequently, with a full cargo of 3,800 tons of wheat and 300 tons of coal, she left Calcutta, drawing 23.7 mean.

A bushel of salt weighs 56 lbs.

The ordinary barrel weighs 280 lbs., measures 6 ft. 6 ins.

One ton of bulk salt stows in about 37 cubic feet.

SALT, Chloride of Sodium (Common Salt), is an extremely abundant substance in nature. It is found in rocky deposits, brine springs, and extensive beds. The waters of the ocean, and some inland seas, hold it in solution. From these various sources it is prepared for use as a condiment in food, and the raw material is extensively used in chemical manufactures. Salts in chemistry include a great variety of compound substances, concerning which no general statement can be made here.

SALTPETRE, Nitrate of Potash.—The stowage of saltpetre requires care, and it should not be near inflammable articles. When mixed with oil, tallow, grease, etc., it has some of the properties of gunpowder, only requiring a light to blow the bottom out of the ship, or do other serious damage below. From its weight this article should be stowed low down. If other dry goods are put over it there should be single or double mats and a layer of dunnage to separate both, or the moisture caused by the nitre may cause damage. Before stowing saltpetre in a hold where oil has been previously carried, the bilges should be thoroughly washed out; the mixed drainage from oil and saltpetre is said to form a highly dangerous compound.

"Stevens on Stowage" says:—"Saltpetre is considered one of the most risky articles to deal with on the long list of imported goods, owing to its liability to be washed away by sea water, while other goods are often more or less damaged by it."

Saltpetre should not be stowed over sugar; its specific gravity is greater, and it is liable to less injury from sugar than sugar is from it. Sugar will alter the colour of saltpetre, and it is better for both that they should not be stowed together.

One ton of 20 cwt. stows in about 36 feet.

SALTS, EPSOM.—Packed in casks, kegs, etc.

20 cwt. in casks stow in 60 feet.

20 cwt. in kegs stow in 55 feet.

SALT WATER.—A cubic foot of sea-water weighs 64 lbs., and 35 cubic feet of sea-water weigh one ton of 20 cwt. At the bottom of the ocean the water is only a few degrees above freezing-point.

The following table represents the pressure in lbs. on the square inch at various depths of salt water:—

10 ft.	4 lbs. on the sq. in.	90 ft.	39 lbs. on the sq. in.
20 ft.	8½ lbs. ,,	100 ft.	43½ lbs. ,,
30 ft.	12¾ lbs. ,,	110 ft.	47¾ lbs. ,,
40 ft.	17¼ lbs. ,,	120 ft.	52¼ lbs. ,,
50 ft.	21¾ lbs. ,,	130 ft.	56½ lbs. ,,
60 ft	26¼ lbs. ,,	140 ft.	60¾ lbs. ,,
70 ft.	30½ lbs. ,,	150 ft.	65¼ lbs. ,,
80 ft.	34¾ lbs. ,,	200 ft.	86 lbs. ,,

The Admiralty limit for divers is 120 feet, but this has been exceeded on occasions by private firms, so far as to depths of 160 to 180 feet, in the recovery of treasure from wrecks. A depth of 140 feet is not considered a great risk by Messrs. Siebe, Gorman & Co.

SANDAL and JAPAN WOOD should be treated as valuable, and only used for dunnage or broken stowage among dry articles not liable to damage. Sandal wood is very heavy and sinks in water; salt water turns it black. Care should be taken that the logs or pieces are neither cut nor broken. It should not be stowed near oil, tar, saltpetre, etc.

SARSAPARILLA.—The root of a plant; has no objectionable qualities. Cases containing bottles of manufactured sarsaparilla should be stowed as beer, spirits, etc.

Average size of cases, 1 ft. 8 ins.

SCHIST.—A mineral clay having a strong odour of tar.

20 cwt. in cases will stow in 62 feet.

SCHOOL SLATES.—Packed in cases which should be stowed on their edges, fore-and-aft. (*See* **Stationery.**)

20 cwt. stow in 24 feet.

SEALING WAX.—In cases. Should be stowed as dry goods.

SEED LAC.—*See* **Lac.**

SEEDS.—Small consignments of vegetable and flower seeds should be packed in air-tight zinc cases when required to pass the

tropics, or their germinating powers will be destroyed. When receiving seeds of any kind of grain or of coffee in bags, care should be taken to prevent any bags bursting in the slings or in lowering them down the hatch. Damage is often caused by putting too great a number in one hoist. Some seeds require special care in stowing, and to be kept free from moisture; if possible, no damp or moist cargo should be placed near them, as they are very liable to become heated. Seeds generally occupy more space than calculated on, and sometimes lose considerable weight on board ship; they are affected much the same as grain. Bags for broken stowage, beam-fillings, holes, corners, etc., are usually taken at less freight.

Oil seeds are a most important article of freight from the East. They are usually stowed, being light, in the 'tween decks, and are shipped all the year round. With an entire cargo of seed, ships require ballast. In the Black Sea and the Sea of Azof whole cargoes are frequently shipped in bulk, when strong shifting boards are absolutely necessary.

One ton, 20 cwt. or 2,240 lbs., rape seed stows in 60 feet.
" " " mustard seed stows in 60 feet.
" " " castor seed stows in 84 feet.
" " " poppy seed stows in 70 feet.
20 cwt. of linseed stow in about 58 cubic feet.
20 cwt. of canary seed stow in about 60 cubic feet.

SEMOLINA.—A kind of flour. 20 cwt. in bags stow in 60 feet.

SENNA LEAVES.—The dried leaflets of various species of the large leguminous genus, *Cassia*; packed in bags and casks. Should be stowed among dry goods and away from highly-scented articles likely to impregnate it with their odour.

20 cwt. in bales stow in 125 feet.

SESAMUM SEEDS.—In bags, measure 8 cubic feet. (100 catties of tea make 1 picul = 133 lbs., but the catty varies.) In cases, measure 4 cubic feet, weight about 50 catties.

SEWING MACHINES.—Packed in cases, average weight of several shipments 245 lbs., measurement 8 ft. 11 ins. each. Other cases of 279 lbs. measure 9 ft. 5 ins. each.

20 cwt. stow in 81 feet.

SHARKS.—The shark is becoming a prominent element in the commerce of the Pacific. Years ago the fins and tails only were taken, cut off, dried, and sold to local traders, but now German houses buy the whole skins as well. They are shipped direct to

Germany, to be tanned by a new process. Fins and tails, bought for five cents a pound in trade goods at the Line Islands, fetch from £50 to £60 per ton in Sydney, where they are bought by Chinese merchants for shipment to China. Ocean Island in 0° 25′ S. lat. is the headquarters of the industry; the sea is infested by swarms of sharks. The people catch them with rude but serviceable tackle, and sell about 30 tons of fins and tails a year. They are a boisterous, intractable race, allied in race and speech to the Kingsmill Islanders, and they number about 300. Midway Island, in the North Pacific, is another centre, and is resorted to by shark-catchers from Honolulu. Whaleships now find it profitable to take all the sharks they can catch.

SHARKS' FINS, etc.—This article has a disagreeable odour, and consequently should not be stowed with anything liable to be damaged thereby.

20 cwt., in bales, stow in about 135 feet.

SHELLAC is formed by melting seed-lac, straining it through a cotton bag, and while still viscous pressing it out between flat stones or leaves into thin scales. Chemically lac is a mixture of several resins, but as a whole it is soluble in a solution of borax. It constitutes the principal ingredient in ordinary sealing-wax. A varnish is also prepared from it, much used by hatters for stiffening silk and felt hats.

It is generally packed in cases lined with cloth or fine mats, and can then be stowed as general cargo. In stowing, keep the cases on their edges, if possible, as it prevents the sheets of lac adhering to each other and becoming one solid block, especially in hot weather in the Red Sea. (*See* **Lac.**)

Cases of shellac alongside at Calcutta ready for shipment to United Kingdom averaged 37 ins., by 24 ins., by 20 ins., about 10 ft. 4 ins., covered with gunny cloths, marked and numbered.

20 cwt. stow in about 83 feet.

Average weight 2½ cwt. each; of other sorts, 20 cwt. in 85 feet.

SHELLS.—In bags, 20 cwt. stow in 65 to 80 feet. (*See* **Cowries.**)

SHIFTING BOARDS.—(*See* **Grain**). "Stevens on Stowage," giving extracts from the report of S. F. Mackie, Esq., Lloyd's Agent at New York, upon the seaworthiness of vessels with grain cargoes, says:—

"Bulk grain is a semi-fluid whose angle of repose is 30°. This angle is determined for perfectly still masses of grain on shore; while the same grain when afloat, from the rolling and pitching

motion of the vessel, would only have a repose angle of 15°, and as soon as the list of the vessel exceeds the angle of repose the grain will commence to move; as it is certain that a vessel will roll through a greater angle than 15°, it is almost certain that bulk grain will move more or less every voyage. The effect of shifting boards is very great, and no vessel is seaworthy without them; if their number is increased the seaworthiness is rapidly increased, and by using several sets the shifting of the cargo is practically reduced to an insignificant quantity. With one set of shifting boards it is quite possible that many vessels are hardly seaworthy, but there can be no doubt that any vessel is seaworthy when she has two or three sets. If it were possible to keep the hold full of grain there could be no shifting, but as grain settles this is impossible. Men of great experience say that with careful trimming this settlement will be from 5 to 7½ per cent. of the depth of the hold, and with slack trimming of course it will be much more. It is unquestionable that grain moves under shifting boards which do not extend from deck to ceiling. The value of good shifting boards can hardly be over-estimated. If they are not strong enough and give way, the vessel is utterly at the mercy of the waves, and only requires to meet with sufficiently bad weather to go to the bottom. Once she gets a bad list no seamanship can save her, as once on her beam-ends she must infallibly go. It would be idle to cut away the masts in the vain hope of saving her; yet until the wave came which gave that one too-deep roll, and before which there was no sign to betray her instability, she would act as if she were a stiff seaworthy ship." (Feeders, *see* **Grain.**)

SHOE PEGS.—Generally packed in barrels, containing 4½ bushels each; measurement about 7 cubic feet.

Weight 120 to 125 lbs. each barrel. Stow as dry goods.

SHOYU, OR SOYUR.—A sauce much used for cooking, etc., in China and Japan. Packed in tubs and casks. (*See* **Soy.**)

SILK.—Usually packed in boxes or bales and considered choice freight; to be carefully stowed in a part of the hold where it will be secure from damage. Silk should not be stowed near oil, tar, grease, iron, or near the combings of the hatches, where it might get injured by leakage from above. Being a valuable article, it should be taken in and tallied carefully by an officer. Provision should also be made to prevent the stevedore's men from broaching the packages when below.

Fine Silk.—(Canton).—In bales. Weight 115 lbs. gross, 107 lbs. net. Eight bales stow in 40 cubic feet.

Waste Silk.—One bale measures 8 cubic feet, and weighs 138 to 142 lbs. gross, net weight 1 picul; 5 bales to a ton measurement. Value $50 to $75 per bale.

Japanese waste silk (the combings after the silk is drawn) emits an offensive exhalation, injurious to tea.

Punjum Silk.—Packed in cases measuring 8 cubic feet, and weighing 1 picul net. Value $130 to $140 per picul.

Yellow Silk.—In cases 8 cubic feet each, and weighing 1 picul net. Value $350 to $400 per picul.

Silk Piece Goods.—Packed in tin-lined cases; measurement and weight vary according to size of packages. To India, generally the cases measure from 9 to 20 cubic feet, and weigh from 2 to 3 piculs gross.

Floss Silk.—In cases measuring 5 to 6 cubic feet and weighing 1 picul net. Sometimes put up in cases weighing half-picul net. Value $400 to $500 per picul.

20 cwt., in bales, should stow in 65 feet; 20 cwt. silk waste in 130 feet (uncertain). A catty of silk equals 2⅔ lbs.

Bales of silk, 20 cwt. should stow in 100 feet.

Cases of silk piece goods are said to stow 20 cwt. in 112 feet.

SILVER.—Fine, 693 lbs. equal one cubic foot. Standard, 658 lbs. equal one cubic foot. (*See* **Gold, etc.**)

SKINS.—Bales of skins, or dried hides, shipped at Sicilian and other Mediterranean ports, often apparently free from objectionable qualities when alongside, should not be stowed in a hold or compartment with macaroni, flour, or any article liable to damage by the strong, pungent, creosote smell, which they are sure to cause when confined below on the voyage. (*See* **Hides.**)

SLATES.—When shipped loose, roofing slates stow on their edges. School slates are generally packed in cases, and are awkward to move, being heavy. Avoid rough handling.

Cases 500 to 600 lbs. each, measure 6 ft. 8 ins. 20 cwt. stow in 24 feet.

SLEEPERS.—Wood, steel, or iron pot sleepers are generally carried in a part of the hold among machinery or heavy goods. When made of wood, they are often painted or impregnated with tar or creosote (*see* Creosote), and consequently emit a strong odour.

It is not unknown to have whole cargoes of foodstuffs ruined by being stowed in the hold which has recently contained creosoted

goods, so that the utmost care must be taken to have the holds thoroughly cleansed after they are discharged.

20 cwt. steel sleepers stow in 22 feet.

Cast iron pot sleepers, 20 cwt. in 37 feet.

Steel broad-gauge sleepers, 20 cwt. in 38 feet.

Hard wood sleepers, 20 cwt. stow in 50 feet.

SOAP.—Manufactured soaps, packed in cases, etc., generally free from objectionable qualities, may be stowed in any safe place below. Soft soap, however, should be kept apart from dry or perishable articles, as in hot weather it will often run and damage other goods. When stowed in kegs it often gets entirely adrift.

Large shipments of manufactured soap are made between Marseilles and U.K.

Marseilles boxes weigh on an average 25 lbs.

Admiralty allows 11 half-hogsheads, or 24 small casks, to a ton.

Boxes from U.K. weigh about 112 lbs., measure 24 by 16 by 12 inches.

Boxes from U.K. weigh about 336 lbs., measure 45 by 16 by 16 inches.

New York boxes weigh 500 lbs., measure 14 cubic feet.

Crates weigh 400 lbs., measure 7 cubic feet; one ton of 20 cwt. manufactured soap in boxes stows in 46 feet.

SODA.—Casks of soda should not be stowed with dry goods, for in the hold it will, like salt, cause a dampness all round about. When carried with general cargo, in large quantities, a part of the ship should be used specially for such articles.

20 cwt. or 1 ton of soda, in casks, stows in about 54 cubic feet.

One bag of soda measured 3 ft. 2 ins. by 1 ft. 11 ins. by 11 ins. = 5 ft. 7 ins., and weighed 2 cwt.

20 cwt. should stow in 57 feet.

SOY (in Casks).—A sauce used in China and Japan. Measure 12 feet, weight 1 picul net. Stowage required on bottom of hold. Treat as moist goods.

SPECIE.—The following are legal tender up to and including the annexed amounts:—

Of the British Royal Mint.	Gold coins	up to any amount
	Silver coins	„ £2.
	1d. and ½d. coins	„ 1s.
	½d. coins (farthings)	„ 6d.

Bank of England notes are legal tender in England and Wales (except by the Bank of England itself). A creditor cannot be compelled to give change. If a debtor requires a receipt, he must prepare it, stamp it, and offer it for signature to his creditor, who by refusal to sign renders himself liable to a penalty. The actual notes or coins must be produced by the debtor, and offered in payment, otherwise "*legal tender*" has not been made. (*See* **Gold and Silver.**)

SPECIFIC GRAVITY.—The *weight* or sp. gr. of a body is the proportion it bears to the weight of another body of known density or of equal volume, and which is adopted as a standard.

Water is well suited for such a purpose, and a cubic foot of fresh water at 60° F. weighs approximately 1,000 ounces = 62.321 lbs.; a gallon of water = 10 lbs. Its weight is taken as the unit for comparison in the following Tables, which give the specific gravity for most of the articles named in "Notes on Stowage, etc."

SOLIDS.

METALS.

Substances.	*Sp. Gr.*	*Substances.*	*Sp. Gr.*
Aluminium, cast	2560	Copper, cast	8788
„ wrought	2670	„ plates	8698
„ bronze	2700	„ wire and bolts	8880
Antimony	6712	„ ordinary mean	8880
Arsenic	5763	Gold, pure cast	19258
Barium	470	„ hammered	19361
Bismuth	9823	„ 22 carats, fine	17486
Boron	2000	„ 20 „ „	15709
Brass, sheets, cop. 75, zinc 25	8450	Iridium	18680
„ yellow, „ 66, „ 34	8300	„ hammered	23000
„ muntz, cop. 60, zinc 40	8200	Iron, cast, gun metal	7308
„ plate	8380	„ minimum	6900
„ cast	8100	„ maximum	7500
„ wire	8214	„ ordinary mean	7207
Bromine	3000	„ mean, Eng.	7217
Bronze, gun metal	8750	„ cast, hot blast	7065
„ ordinary mean	8217	„ cast, cold blast	7218
„ cop. 84, tin 16	8832	„ wrought bars	7788
„ „ 81, „ 19	8700	„ „ wire	7774
„ small bells, cop. 35, tin 65	8060	„ „ rolled plates	7704
„ copper 26, tin 74	7390	„ „ average	7698
Cadmium	8650	„ „ Eng. rails	7540
Calcium	1580	„ „ Lowmoor	7808
Chromium	5900	„ „ pure	8140
Cinnabar	8098	„ ordinary mean	7744
Cobalt	8600	Lead, cast	11352
Columbium	6000	„ rolled	11388

Substances.	*Sp. Gr.*
Lithium	590
Magnesium	1750
Manganese	8000
Mercury—40° (8° below Zero)	15632
,, 32° (Freezing)	13598
,, 60°	13569
,, 212°	13370
Molybdenum	8600
Nickel	8800
,, cast	8279
Osmium	10000
Palladium	11350
Platinum, hammered	20337
,, native	16000
,, rolled	22069
Potassium 59°	865
Red lead	8940
Rhodium	10650
Rubidium	1520
Ruthenium	8600
Selenium	5500
Silver, pure cast	10474
,, ,, hammered	10511
Sodium	970
Steel, minimum	7700
,, maximum	7900
,, plates, mean	7806
,, soft	7833
,, tempered and hardened	7818
,, wire	7847
,, blistered	7823
,, crucible	7842
,, cast	7848
,, Bessemer	7852
,, ordinary mean	7834
Strontium	2540
Tellurium	6110
Thalium	11850
Tin, Cornish hammered	7390
,, ,, pure	7291
Titanium	5300
Tungsten	17000
Uranium	18330
Wolfram	7119
Zinc, cast	6861
,, rolled	7191

WOODS (*Dry*).

Alder	800
Apple	793
Ash	690-845
Bamboo	400
Bay-tree	822
Beech	690-852
Birch	567-720
Blackwood, India	898
Boxwood, Brazil	1031
,, France	1328
,, Holland	912
Bullet-wood	928
Butternut	376
Campeachy	913
Cedar	561
,, Indian	1315
Charcoal, pine	441
,, fresh burned	380
,, oak	1573
,, soft wood	280
,, triturated	1380
Cherry	715
Chestnut, sweet	610
Citron	726
Cocoa	1040
Cork	240
Cypress, Spanish	644
Dogwood	756
Ebony, American	1331
,, Indian	1209
Elder	695
Elm	570-671
,, rock	800
Erroul, India	1014
Filbert	600
Fir, Norway Spruce	512
,, Dantzic	582
Fustic	970
Greenheart, or Sipiri	1055
Gum, blue	843
,, water	1000
Hackmatack	592
Hawthorn	910
Hazel	860
Hemlock	368
Hickory, pig-nut	792
,, shell-bark	690
Holly	760
Ironwood	990
Jasmine	770
Juniper	566
Khair, India	1171
Lancewood, mean	720
Larch	544-560
Lemon	703
Lignum-vitae	650-1333
Lime	804
Linden	604
Locust	728
Logwood	913
Mahogany	720-1063
,, Honduras	560

Substances.	*Sp. Gr.*
Mahogany, Spanish	852
Maple	750
,, Bird's Eye	576
Mastic	849
Mulberry	561-897
Oak, African	823
,, Canadian	872
,, Dantzic	759
,, English	858-932
,, green	1146
,, heart, 60 years	1170
,, live, green	1260
,, ,, seasoned	1068
,, white	860
Olive	680
Orange	705
Pear	661
Persimmon	710
Plum	785
Pine, pitch	660
,, red	590
Pine, white	554
,, yellow	461
,, Norway	740
Pomegranate	1354
Poon	580
Poplar	383
,, white	529
Quince	705
Rosewood	728
Sandalwood (sinks)	
Sassafras	482
Satinwood	885
Spruce	500
Sycamore	623
Tamarack	383
Teak (African oak)	657-980
Walnut	671
,, black	500
Willow	486-585
Yew, Dutch	788
,, Spanish	807

(*Well-seasoned Woods.*)

Ash	722
Beech	624
Cherry	606
Cypress	441
Hickory, red	838
Mahogany, St. Domingo	720
Pine, white	473
,, yellow	541
Poplar	587
White oak, upland	687
,, ,, James River	759

STONES, EARTHS, Etc.

Alabaster, white	2730
,, yellow	2699
Alum	1714
Amber	1078
Ambergris	866
Asbestos, starry	3073
Asphalt	2250
Barytes, sulphate	4000-4865
Beton, N.Y. St. Con'g Co	2305
Basalt	2740-2864
Bitumen, red	1160
,, brown	830
Borax	1714
Brick	1367-1900
,, pressed	2400
,, fire	2201
,, work in cement	1800
,, ,, ,, mortar	1600-2000
Carbon	3500
Cement, Portland	1300
,, Roman	1560
Chalk	1520-2784
Clay	1930
,, with gravel	2480
Coal, Anthracite	1350-1640
,, Borneo	1290
,, Cannel	1238-1318
,, Caking	1277
,, Cherry	1276
,, Chili	1290
,, Derbyshire	1292
,, Lancaster	1273
,, Maryland	1355
,, Newcastle	1270
,, Rive de Gier	1300
,, Scotch	1259-1330
,, Splint	1302
,, Welsh, mean	1315
Coke	1000
,, Nat 'l, Va	746
Concrete, in cement	2200
,, mean	2000
Earth, common soil, dry	1216
,, loose	1500
,, moist sand	2050
,, mould, fresh	2050
,, rammed	1600
,, rough sand	1920

Substances.	*Sp. Gr.*
Earth, with gravel	2020
,, potters'	1900
,, light vegetable	1400
Emery	4000
Feldspar	2600
Flint, black	2582
,, white	2594
Fluorine	1320
Fuel, Warlich's	1150
,, lignite	1300
Glass, bottle	2732
,, crown	2487
,, flint	2933-3200
,, green	2642
,, optical	3450
,, white	2892
,, window	2642
,, soluble	1250
Gneiss, common	270
Granite, Egyptian red	2654
,, Patapsco	2640
,, Quincy	2652
,, Scotch	2625
,, Susquehanna	2704
,, ,, grey	2800
Graphite	2200
Gravel, common	1749
Grindstone	2143
Gypsum, opaque	2168
Hone, white, razor	2876
Hornblende	2540
Iodine	4940
Lava, Vesuvius	1710-2810
Lias	1350
Lime, quick	804
,, hydraulic	2745
Limestone, white	3156
,, green	3180
Magnesia, carbonate	2400
Magnetic ore	5094
Marble, Adelaide	2715
,, African	2708
,, Biscayan, black	2695
,, Carrara	2716
,, common	2686
,, Egyptian	2668
,, French	2649
,, Italian, white	2708
,, Parian	2838
,, Vermont, white	2650
,, Silesian	2730
Marl, mean	1750
,, tough	2340
Masonry, rubble	2050
,, granite	2640
,, limestone	2640

Substances.	*Sp. Gr.*
Masonry, sandstone	2160
,, brick	2240
,, ,, rough work	1600
Mica	2800
Millstone	2484
,, quartz	1260
Mortar	1384-1750
Mud	1630
Mud, wet and fluid	1782
,, ,, ,, ,, pressed	1920
Nitre	1900
Oyster-shell	2092
Paving-stone	2416
Peat, Irish, light	278
,, ,, dense	562
,, very dense	675
,, black	1058-1329
Phosphorus	1770
Plaster of Paris	1176-3400
,, ,, ,, dry	1400
Plumbago	2100
Porcelain, China	2300
Porphyry, red	2765
Pumice-stone	915
Quartz	2660
Red lead	8940
Resin	1089
Rock crystal	2735
Rotten-stone	1981
Salt, common	2130
,, rock	2200
Saltpetre	2090
Sand, coarse	1800
,, common	1670
,, damp and loose	1392
,, dried	1560
,, dry	1420
,, mortar, Ft. Richm'd	1659
,, ,, Brooklyn	1716
,, silicious	1701
Sandstone, mean	2200
,, Sydney	2237
Schorl	3170
Scoria, volcanic	830
Sewer pipe, mean	2250
Shale	2600
Slate	2672-2900
,, purple	2784
Smalt	2440
Soapstone	2730
Spar, calcareous	2735
,, feld, blue	2693
,, ,, green	2704
,, fluor	3400
Specular ore	5251
Stalactite	2415

Substances.	*Sp. Gr.*
Stone, Bath (English)	1961
,, Blue Hill	2640
,, Bluestone (basalt)	2625
,, Breakneck, N.Y.	2704
,, Bristol (Engl.)	2510
,, Caen, Normandy	2076
,, common	2520
,, Craigleith (Scotland)	2316
,, Kentish rag	2651
,, Kip's Bay, N.Y.	2759
Stone, Norfolk (Parliament House)	2304
,, Portland (Engl.)	2368
,, Staten Isl'd, N.Y.	2976
,, Sullivan Co. ,,	2688
Sulphur, native	2033
Terra Cotta	1952
Tile	1815
Trap	2720

GRANITE.

(*Gen'l Gillmore, U.S.A.*)

Duluth, Minn., dark	2780	New London	2660
Fall River, Mass., grey	2635	Quincy, Mass., light	2695
Garrison's, N.Y. ,,	2580	Richmond, Va	2727
Jersey City, N.J., soap	3030	,, ,, grey	2630
Keene, N.H., bluish grey	2656	Staten Island, N.Y.	2861
Maine	2635	Westchester Co., N.Y.	2655
Millstone Pt., Conn.	2706	Westerly, R. I., grey	2670

LIMESTONE.

(*Gen'l Gillmore, U.S.A.*)

Bardstown, Ky., dark	2670	Joliet, Ill., white	2540
Caen, France	1900	Kingston, N.Y.	2690
Canajoharie, N.Y.	2685	Lake Champlain, N.Y.	2750
Cooper Co., Mo., d'k drab	2320	Lime Island, Mich., drab	2500
Erie Co., N.Y., blue	2640	Marblehead, Ohio, white	2400
Garrison's, N.Y.	2635	Marquette, Mich., drab	2340
Glens' Falls ,,	2700	Sturgeon Bay, Wis., bluish drab	2780

MARBLE.

(*Gen'l Gillmore, U.S.A.*)

Dorset, Vt.	2635	Mill Creek, Ill., drab	2570
East Chester, N.Y.	2875	North Bay, Wis.	2800
Italian, common	2690		

SANDSTONES.

(*Gen'l Gillmore, U.S.A.*)

Albion, N.Y., brown	2420	Little Falls, N.Y., brown	2250
Belleville, N.J., grey	2259	Marquette, Mich., purple	2285
Berea, Ohio, drab	2110	Masillon, O., yellow drab	2110
Cleveland, Ohio, olive green.	2240	Medina, N.Y., pink	2410
Edinburgh, Scot., Craigleith	2260	Middletown, Ct., brown	2360
Fond du Lac, Wis., purple	2220	Seneca, Ohio, red ,,	2390
Fontenac, Minn., light buff	2325	Vermilion, Ohio, drab	2160
Haverstraw, N.Y., red	2130	Warrensburgh, Mo.	2140
Kasota, Minn., pink	2630		

PRECIOUS STONES.

Substances.	*Sp. Gr.*	*Substances.*	*Sp. Gr.*
Agate	2590	Jet	1300
Amethyst	3920	Lapis lazuli	2960
Carnelian	2613	Malachite	4020
Chrysolite	2782	Onyx	2700
Diamond, Oriental	3521	Opal	2090
,, Brazilian	3444	Pearl, Oriental	2650
,, pure	3520	Ruby	3980
Emerald	3950	Sapphire	3994
,, aquamarine	2730	Topaz	3500
Garnet	4189	Tourmaline	3070
,, black	3750	Turquoise	2750
Jasper	2610		

MISCELLANEOUS.

Amber	1090	Gutta-percha	980
Atmospheric Air	·001292	Hay, old compact	1288
Beeswax	965	Horn	1689
Bone	1900	Human body	1070
Butter	942	Ice, at 32°	922
Camphor	988	Indigo	1006
Caoutchouc	930	Isinglass	1111
Cotton	950	Ivory	1825
Dynamite	1650	Lard	947
Egg	1090	Leather	960
Fat of Beef	923	Mastic	1074
,, ,, Hogs	936	Myrrh	1360
,, ,, Mutton	923	Nitro-Glycerine	1600
Flax	1790	Opium	1336
Gamboge	1222	Potash	2100
Glycerine, 60°	1261	Resin	1089
Grain, Barley	590	Soap, Castile	1071
,, Oats	500	Spermaceti	943
,, Wheat	750	Starch	950
Gum Arabic	1452	Sugar	1606
Gunpowder, loose	900	,, 66°	·972-1326
,, shaken	1000	Tallow	941
,, solid	1550-1800	Wax	964-970

LIQUIDS.

Acid, Acetic	1062	Alcohol, 40 per cent.	951
,, Benzoic	667	,, 25 ,,	970
,, Citric	1034	,, 10 ,,	986
,, Concentrated	1521	,, 5 ,,	992
,, Fluoric	1500	,, proof spirit, 50 per cent., 60°	934
,, Muriatic	1200	,, proof spirit, 50 per cent., 80°	875
,, Nitric	1217	Ammonia, 27·9 per cent.	891
,, Nitrous	1550	Aquafortis, double	1300
,, Phosphoric	1558	,, single	1200
,, ,, solid	2800	Beer	1034
,, Sulphuric	1849	Benzine	850
Alcohol, pure, 60°	794	Bitumen, liquid	848
,, 95 per cent.	816	Blood (human)	1045
,, 80 ,,	863		
,, 50 ,,	934		

Substances.	*Sp. Gr.*	*Substances.*	*Sp. Gr.*
Brandy, 83 or 85 p.c. of spirit	924	Oil, Turpentine	870
Bromine	2966	,, Whale	923
Cider	1018	Spirit, rectified	824
Ether, Acetic	668	Steam, at 212°	·00061
,, Muriatic	845	Tar	1015
,, Nitric	1110	Vinegar	1080
,, Sulphuric	715	Water, at 32°	998·7
Honey	1450	,, ,, 39°	998·8
Milk	1032	,, ,, 62°	997·7
Oil, Anise-seed	986	,, ,, 212°	956·4
,, Codfish	923	,, distilled, at 39°	998
,, Linseed	940	,, Dead Sea	1240
,, Naphtha	850	,, Mediterranean	1029
,, Olive	915	,, sea	1027
,, Palm	969	,, Black Sea	1016
,, Paraffin at 60°	790-800	,, rain	1000
,, Petrol ,,	690-700	Wine, Burgundy	992
,, Petroleum	880	,, Champagne	997
,, Rape	914	,, Madeira	1038
,, Sunflower	926	,, Port	997

SPELTER.—A metal of brilliant white colour, with shade of blue. In large shipments it is generally built up in a column near the hatch. It has been found very convenient for trimming or stiffening ships with light or general cargo. Spelter and tile copper require to be stowed closer than railway bars, as they are more liable to shift in bad weather. On the passage from Stettin to London, on board a steamship, spelter stowed upon oats had caused them to become heated and discoloured. (*See* **Oats.**)

20 cwt. of block tin, or spelter, should stow in 7 to 8 feet.

SPERMACETI.—Manufactured into articles such as ointment, etc. Stow as valuable in a cool part of the ship. (*See* **Whale Oil.**)

Packed in boxes, 56 lbs.

20 cwt. stow in about 52 cubic feet.

SPICES.—The term is generally restricted to several flavouring substances used with food, and includes such articles as ginger, cinnamon, cassia, nutmegs, mace, cloves, allspice, pimento, caraway, coriander, etc., etc.

In stowing choice articles of this nature, care should be taken to keep them apart from moist or other objectionable articles likely to do damage by contact.

SPONGE.—The covering of a certain zoophyte. It is unfit for shipment when first recovered from the deep, but after undergoing purification is cleaned, dried, and pressed into bales. Sponges sometimes have a musty smell, which must be taken into account in stowing. Generally packed in baskets, or in bales 56 lbs. each.

20 cwt. stow in about 152 cubic feet, sometimes more.

SPONTANEOUS COMBUSTION.—Certain kinds of coal, cotton, or oily waste, inodorous felt, oiled cloth, rape seed, old rags, hay, and certain other articles are liable to heat and fire if not very well ventilated. (*See* **Inodorous Felt, etc.**)

STABILITY OF SHIPS.—*See* **" Stability and Trim of Ships, in Practice " (one shilling).**

STARCH.—A substance made from flour, potatoes, rice, or other vegetables. Packed in boxes and barrels. Should be stowed as dry goods, apart from articles such as soda, potash, saltpetre, etc., and from all ammoniacal matters ; liquids placed near starch will be liable to leak.

Boxes weigh 48 to 50 lbs., gross, measure 16 cubic inches.

Barrels weigh 240 lbs., measure 8 ft. 6 ins.

20 cwt., in cases, stow in about 80 feet.

STATIONERY.—Books, papers, etc., are generally packed in tin-lined cases ; they should be carefully handled and stowed in a dry, safe part of the hold, where they will be free from damp, pressure, or strong odours.

Cases of writing paper weigh 360 lbs. each ; 20 cwt. stow in 67 cubic feet.

Cases of lead pencils average 19 to 24 feet.

STAVES.—Vessels carrying full cargoes of staves require D.W. or ballast, which should be levelled off forward and aft before beginning to stow. The layers are formed by placing the staves edge-ways in the direction of the keelson fore-and-aft, being lightly driven in by a lignum vitæ hammer or maul. This is continued until the vessel is loaded. The vessel should be trimmed with the ballast in the first instance. When shipped for broken stowage, staves may be used for dunnage, but this should be stated clearly in the receipt and B. L. In signing for large quantities it is better to state *about* or *said to be so many* on board, all on board to be delivered. Sometimes shippers will not take this receipt, in which case extra care in counting should be arranged for if possible. (*See* **Timber.**)

Staves.—Pipe, length 4½ feet. *Extra heavy*, weigh 7 to 8 tons per gross mille of 1,200 pieces ; measure 5½ feet each. *Heavy*, weigh 6 to 7 tons per gross mille of 1,200 pieces. *Light*, weigh 5 to 6 tons per gross mille of 1,200 pieces.

Hogshead, length 3½ feet. *Extra heavy*, weigh 5 to 6 tons per gross mille of 1,200 pieces. *Heavy*, weigh 4 to 5 tons per gross mille of 1,200 pieces. *Light*, weigh 3¼ to 4 tons per gross mille of 1,200 pieces.

Barrel, length 32 inches. *Extra heavy*, weigh 4 tons per gross mille of 1,200 pieces. *Heavy*, weigh 3 to 4 tons per gross mille of 1,200 pieces. *Light*, weigh 2 to 3 tons per gross mille of 1,200 pieces.

Bundles of sugar cask staves, 20 cwt. stow in 96 feet.

STEARINE.—*See* **Lard.**

STEEL.—*See* **Iron and Steel.**

STEVEDORE.—The Stevedore is the officer or the person who may be engaged for the loading or unloading of the ship. (*See* **General Cargo.**)

STICK LAC.—*See* **Lac.**

STICKS.—Bags of sticks, or handles, etc., each 110 lbs., 20 cwt. stow in 125 feet. (*See* **Canes.**)

STONE CARGOES.—Goods of this description when shipped in any large quantity should be kept fairly high to prevent labouring in heavy weather. (*See* **Marble.**)

The following Table is approximately correct :

20 *cwt.*—	*cub. ft.*	20 *cwt.*—	*cub. ft.*
Bath Stone	16 or 17	Guernsey, blocks	13⅝
Caen Stone	17	Limestone, Plymouth	13¼
Craigleith	15	Marble, white	13½
Dundee	13¾	,, Carrara	13½
Granite, Dartmoor	15	Paving Stone	15
,, Aberdeen	15	Porphyry (red)	12½
,, Penrhyn	15	Purbeck	13½
,, Penzance	15	Portland Stone	17
		Slate, Welsh	13

STORES, PROVISIONS, etc.—The Ship's Stores should be kept in properly fitted store-rooms. Having such articles continually moved about in the holds, which is often the case where insufficient room is allowed, has been found an objectionable and expensive plan. The removal each time the cargo is worked damages the quality of the articles, besides which, labourers and others often broach and steal the contents of such packages, which go against the ship's consumption for the voyage. The arrangement of the different articles for the voyage also requires care and attention.

For instance, provisions left over from a previous voyage should be placed so as to be used first. Damp or moist articles, such as beef, pork, suet, lime-juice, etc., should be stowed under dry articles, such as tea, flour, bread, oatmeal, sugar, etc., or kept separate from them in other ways.

Passenger ships should be so stowed that the consumption of

water, fuel, and provisions will lighten them bodily, and keep them in trim. All spirits, etc., whether for ship's use or freight, should be received and struck below with as little delay as possible. Whenever wines or spirits are stowed with cargo, a bulkhead should, if practicable, be built against them, that there may be no temptation to plunder. They should be stowed in emigrant ships in such a manner that neither crew nor passengers can by any possibility get at them.

Ship's coffee, tea, sugar, butter, etc., will often get tainted by other articles if not kept separate. A ship having previously carried Lascars' provisions in the store-room, the place got over-run by weevils from the rice; some dry stores were afterwards found injured by them. At Cardiff a complaint was made by the crew of a vessel that their sugar tasted of lamp oil and was unfit for use. On examination it was found that, after serving out the oil, the feeder was generally hung over the casks of sugar, which had become tainted; also probably by the proximity of the oil itself. This caused some delay to the vessel, the crew having refused duty leaving the port,

Stores of a scented nature will sometimes damage tea if stowed on the same deck.

In the "Life of Sir George Burns," Mr. E. Hodder says that the Cunard fleet requires for victualling, in the course of a year, about 3,656 sheep, 1,800 lambs, 2,474 oxen, 24,075 fowls, 4,230 ducks, 2,200 turkeys, 2,200 geese, 53 tons of ham, 20 tons of bacon, 15 tons of cheese and 831,600 eggs. Of minor things there are: One ton and a half of mustard, one ton and three-quarters of pepper, 7,216 bottles of pickles, 8,000 tins of sardines, 30 tons of salt cod and ling, 4,192 four-pound jars of jam, 15 tons of marmalade, 22 tons of raisins, currants, and figs, 18 tons of split peas, 15 tons of pearl barley, 17 tons of rice, 34 tons of oatmeal, 460 tons of flour, 23 tons of biscuits, 33 tons of salt, and 48,900 loaves of bread of 8 lbs. each.

The consumption of wines, mineral waters, and bottled beer is on a corresponding scale—over 15,000 bottles altogether required for a single voyage.

The continuous and unavoidable breakage of glass and earthenware is also another feature of life on the sea which should not be forgotten. A great deal of unnecessary waste in this respect may be avoided by the officers using their influence in preventing servants leaving articles liable to break about the decks, or in unsafe places, where they may fall down by the ship's rolling.

STRAW-BRAID.—Shipped in Japan. Cases measuring each 3 ft. 11 ins. by 3 ft. 3 ins. by 1 ft. 10 ins.=23 ft. 4 ins., weighed 180 lbs. 20 cwt. should stow in about 280 feet.

SUGAR.—The sugar-cane has been cultivated from time immemorial. It was known anciently to many savage tribes of the Eastern Hemisphere, by whom the plant was grown for the sake of the raw juice, or for sweetening food. The cane is said to have been first systematically raised in India, whence the Venetians brought it to Europe in the twelfth century.

England uses seventy-nine pounds of sugar per annum for each individual of her population; the United States consumes sixty-nine pounds *per capita*, France twenty-nine pounds, Germany twenty-three pounds, Austria fifteen pounds, Russia and Spain ten pounds, Italy and Turkey eight pounds. It will be observed that the consumption of sugar in England is greater than any other country. This is accounted for by the fact that a large part is made up into jams, preserves, and marmalades for export. The consumption of sugar has doubled since 1885.

Sugar is packed in hogsheads, casks, boxes, chests, and bags. Sugars packed in casks are usually drained of their syrups, notwithstanding which sometimes as much as 10 per cent. is lost in weight during transit, while clayed sugars lose less in weight, being more thoroughly drained before packed in cases, boxes, or chests.

Some sugars are packed in bags and mats simply, and lose more from drainage. Owing to the drainage of soft sugars they must be stowed with free spaces for the running off of the syrups, keeping them clear of dry pan sugar, otherwise the damage will have to be made good by the vessel.

When the entire cargo consists of sugar in hogsheads, they should be stowed fore-and-aft, with strips of board between, and the hogsheads bedded and chocked with blocks of wood, the second tier being treated in a similar manner. Over these may be stowed bags, boxes, etc., to make up.

When signing Bills of Lading for any "*wood used as dunnage,*" and carried at a low rate, be careful to see that the words are duly inserted in same to avoid liability in case of damage.

Weights of Packages, and Shipping Seasons.

WEST INDIES—BRITISH.

Jamaica.—Hogshead 18 cwt. to 22 cwt., tierce 12 cwt., barrel 2 cwt., bags 2 cwt.; season of shipment, February to August.

Trinidad.—Hogsheads, large, truss 40 to 42 inches; season of shipment, March to end of August.

Barbados.—Hogshead 16 cwt. to 20 cwt.; tierce 10 to 12 cwt., bags 2 cwt.; season of shipment, March to end of August.

Antigua and Tobago.—Hogshead 16 cwt., tierce 10 cwt., barrel 2 cwt.; season of shipment, March to end of August.

Dominica.—Same packages; season of shipment, March to end of August.

Grenada.—Hogshead 16 cwt. to 22 cwt., tierce 10 cwt., barrel 2 cwt.; season of shipment, March to end of August.

St. Vincent.—Hogshead 20 to 23 cwt.; season of shipment, March to end of August.

St. Lucia.—Hogshead 14 cwt. to 18 cwt., tierce 8 to 12 cwt. barrel 2 cwt., bags 2 cwt.; season of shipment, March to end of August.

St. Kitts and Nevis.—Hogshead 15 to 18 cwt., tierce 8 to 12 cwt., barrel 2 cwt.; season of shipment, March to end of August.

FRENCH.

Martinique.—Hogshead 14 cwt., tierce 7 cwt., barrel 2 cwt., bags 2 cwt.; season of shipment, March to end of August.

Guadaloupe.—Hogshead 14 cwt., barrel 2 cwt., bags 2 cwt.; season of shipment, March to end of August.

UNITED STATES.

Cuba.—Hogshead 12 to 14 cwt., tierce 8 to 9 cwt., barrels 2 cwt., bags 2 cwt.; season of shipment, December to August; chief month of shipment, April to September.

Havannah.—Hogshead 1,300 lbs., five boxes about a ton; season of shipment, December to August.

Matanzas.—Hogshead 12 cwt., tierce 8 cwt., barrel 2 cwt., box 4 cwt.; season of shipment, March to July.

Porto Rico.—Hogshead 12 to 14 cwt., tierce 8 to 9 cwt., barrel 2 cwt.; season of shipment, March to July; chief months of shipment, May and June.

SOUTH AMERICA—BRITISH.

Demerara.—Hogshead, large, truss 40 to 42 inches; season of shipment, nearly all the year; chief months of shipment, December to March.

Berbice.—Hogshead 18 to 20 cwt., tierce 10 to 12 cwt., barrels and bags 2 cwt.; season of shipment, nearly all the year.

DUTCH.

Surinam.—Hogshead 17 to 20 cwt., bags 2 cwt; season of shipment nearly all the year; chief months of shipment, October to December.

BRAZIL.

Bahia, Maceio, Marouin, Pernambuco.—Chests 15 to 23 cwt., cases 8 to 10 cwt., and twilled calico bags 1½ cwt.; season of shipment, October to May; chief months of shipment, January to March.

Parahiba.—Bags 1½ cwt.; season of shipment, November to March; chief months of shipment, January and February.

EAST INDIES—BRITISH.

Penang.—Double grass mats ½ to ¾ cwt., also baskets 3 cwt.; season of shipment, October to March; chief months of shipment, December to February.

Bengal.—Cane, Date. *Low*, mats and bags 1¾ cwt., 20 cwt. stow in 39 cubic feet; season of shipment, October to January; chief months of shipment, December to February. *Gurpattah*, bags 1¾ to 2 cwt.; season of shipment, March to August.

Cossipore, Benares.—Bags 1½ cwt.; season of shipment, March to August; chief months of shipment, December to February.

Madras.—*Low*, mats and gunny bags 1½ cwt., chief months of shipment, N.E. monsoon.

Bimlipatam.—Double gunnies 163 lbs.; season of shipment, N.E. monsoon.

Singapore.—Double mats 115 lbs. gross, 112 lbs. nett; season of shipment, January to September.

Mauritius.—Tierces 7 to 9 cwt., mats or vacas 1.36 cwt. gross, bags 2 cwt.; season of shipment, October to March; chiefly shipped in bags.

Port Natal.—Large bags 1½ to 2 cwt.; season of shipment, November to February.

CHINA, SIAM, ETC.

China, Siam.—Bags about 1 to 1¾ cwt. (bags and mats, not wood); season of shipment, October to March.

Philippine Islands.—Bags 56 to 112 lbs; season of shipment, October to August.

Manila.—Shipped in bags, bundles, hogheads, boxes; *unclayed*, in mats and bags.

Sandwich Islands. Bags and barrels 2 to 4 cwt.; chiefly shipped to West Coast of North America.

DUTCH EAST INDIES.

Batavia.—Baskets 3 to 6 cwt.; also mats and bags about ¾ to one cwt., and in canisters; season of shipment, nearly all the year round.

Java, Sourabaya.—Baskets 3 to 6 cwt., tare 28 to 45 lbs ; season of shipment, nearly all the year.

FRENCH.

Bourbon.—Bags about 1¾ to 2 cwt. ; season of shipment, September to April.

EUROPE.

France.—Thin hempen bags 2 cwt., tare 2 lbs. ; season of shipment, October to March ; chief months of shipment, November to January.

Germany.—Bags about 2 cwt., tare 2 lbs. ; season of shipment, October to March ; chief months of shipment, November to January.

Holland.—Casks about 10 cwt., bags 2 cwt., tare 2 lbs. ; season of shipment, October to March ; chief months of shipment, November to January.

Belgium.—Thin hempen bags 2 cwt., tare 2 lbs. ; season of shipment, October to March ; chief months of shipment, November to January.

One ton of 2,240 lbs. of grape sugar in boxes stows in about 42 cubic feet.

One ton of 20 cwt. (Alexandria) in bags, 46 feet.

One ton of 20 cwt. in casks should stow in about 60 feet.

Granulated, New York barrel weighs 350 lbs., measures 9 ft. 2 ins.

Cut loaf, barrel weighs 280 lbs., measures 9 ft. 2 ins.

20 cwt. of sugar in hogsheads stow in 54 feet.

20 cwt. of refined sugar in bags, each 220 lbs., stow in 48 feet.

20 cwt. of ordinary sugar in bags should stow in 40 feet.

Sugar will easily ignite, and is very difficult to extinguish, water having little effect on a burning mass.

SUGAR CANDY.—A crystallised form of sugar, shipped in casks, tubs, cases, or boxes. In hot climates it is said to leak or drain, to the injury of any dry articles stowed near.

20 cwt. stows in 54 feet.

SULPHATE OF SODA, when worked in any quantity, creates a great dust, and often turns out short on delivery in consequence. In stowing, it is much the same as sulphur.

SULPHUR, or Brimstone.—A yellow, brittle mineral found in volcanic districts ; sometimes packed in cases, casks, or bags, often carried in bulk. A cargo of sulphur or brimstone requires no

dunnage if the vessel is lined as for grain. Care should, however, be taken before receiving it in bulk to see all the limbers, etc., clean, and any holes filled up to prevent loose sulphur getting down. In some countries, vessels having sulphur on board are not allowed in port except under certain conditions.

In Sicily there are seven kinds of sulphur, the best being Licata No. 1. In arranging to carry sulphur, it is well to understand that the merchants request you to keep separate and deliver each kind or parcel distinct at port of discharge, although they make no mention of this until the stuff is alongside at port of shipment.

Sulphur is a contraband of war.

20 cwt. of sulphur should stow in 36 feet when in bulk.

In cases, 20 cwt. of sulphur stow in about 40 feet.

In kegs, 20 cwt. of sulphur stow in 60 feet.

SUMAC, or Shumac.—The powdered leaves of a shrub having a yellowish appearance ; used for dyeing purposes. When packed in bags it creates a dust while being worked in and out of a ship's hold. Being a very dry article, it should not be stowed near moist cargo or goods liable to be damaged by contact. It has a pungent, rather sickly smell, especially after being on board a few days.

Bags of Sumac each 5 ft. weigh 162 lbs.

Bales, 4 to the ton of 20 cwt., measure 30 feet each.

Each bag averages about 1½ cwt., say 14 to a ton.

One ton of bags, 20 cwt., stows in about 70 feet.

SUPERPHOSPHATE.—(Manure). The vapour is injurious to tea, coffee, cocoa, etc., and by contact with hemp and similar materials spontaneous combustion may be created. (*See* **Manures.**)

SWEAT.—Under ordinary circumstances the shipowner is exonerated from damage by sweat, such being attributed to a peril of the sea. The Bill of Lading should, however, contain a clause to this effect.

SYRUPS, TREACLE, etc.—In sugar manufacture the term syrup is applied to all saccharine solutions capable of crystallising out ; the ultimate uncrystallisable fluid is distinguished as molasses, or treacle.

In stowing casks of syrup the ground tier in the lower holds should be first laid straight fore-and-aft, each side of the keelson, the heads about one inch apart. Each cask should have good beds, and be firmly placed bung up and bilge free.

It is advisable to stow the casks empty and fill them afterwards.

This necessitates washing each tier, otherwise they get slippery and awkward to work over. Four heights are generally stowed in the lower holds, and two or three in the between decks. (*See* **Molasses.**)

100 barrels of syrup 28 tons.
100 puncheons 65 tons.
100 hogsheads 85 tons.
1 ton of 2,240 lbs. of syrup stows in 44 cubic feet.
Hogshead weighs about 1,900 lbs., measures 36 feet.
Puncheon weighs about 1,466 lbs., measures 27 ft. 5 ins.
Barrel weighs about 660 lbs., measures 12 ft. 9 ins.

TALC.—A mineral (mica) used for various purposes. (*See* **Mica.**)
In casks, 20 cwt. stow in 60 feet.

TALLOW and GREASE.—Generally shipped in casks, which may be stowed six heights. The stowage should be good and each barrel properly bedded and wedged off. (*See* **Casks.**)

It is not uncommon to find old second-hand casks or puncheons used for tallow, grease, etc. Such articles should be signed for as inferior, otherwise, in the event of their giving way, the ship would be liable to repair them. Never stow grease or tallow over dry or valuable goods.

Hogsheads of tallow weigh 1,285 lbs., measure 37 ft. 10 ins.
Tierces of tallow weigh 535 lbs., measure 13 ft. 4 ins. each.
Barrels of tallow weigh 270 lbs., measure 6 ft. 9 ins. each.
20 cwt. of tallow, in casks, stow in 70 feet.
20 cwt. of tallow, in casks, stow in 58 feet.

TAMARINDS, or Tamar Hindy.—The fruit obtained from a tree of that name. That from the West Indies is usually preserved between layers of sugar, hot syrup being poured over the whole when packed. Infused in water it makes a pleasant drink; boiled with milk, and strained, a refreshing cooling whey is produced, useful in cases of fever or sickness.

Dry tamarinds in jars or bags should be carefully stowed among dry articles, but casks of preserved should be put among moist goods, as they are liable to drain if the casks get damaged. Oil, tar, turpentine, and other highly scented goods will damage tamarinds.

Cases, 1 ton of 20 cwt. stows in about 40 to 47 cubic feet.
Casks or kegs, 20 cwt. stow in about 54 feet.

TAN EXTRACT.—Sometimes called chestnut extract, a liquid obtained from the chestnut root, and generally packed in old petroleum casks; weight 540 lbs. each.

Stow much the same as tar. 20 cwt. should go in 48 feet.

TAPIOCA is manufactured from the roots of the cassava. Packed in boxes and tins generally. Stow among dry goods only, and away from scented articles likely to impregnate it.

In Bahia a barrel weighs 1¼ cwt.
20 cwt. should stow in about 57 feet.

TAR.—A bituminous liquid obtained from wood of various species by destructive distillation. Full cargoes of tar require much care in stowing, owing to the liability of the casks to leak and choke the pumps and limbers. Some shipmasters sprinkle sawdust over the bottom to cause the stuff to clog, and thereby be prevented from finding its way below. Casks of tar carried among general goods should be stowed underneath everything, and apart from such articles as tea, sugar, flour, coffee, etc. Tar is an inflammable article.

Average weight of barrel 300 lbs., containing 25 gallons.
20 cwt. of tar, in barrels, stow in about 54 feet.
Coal Tar measures about one-fourth over its weight.

TARES.—The name for the common vetch. Stow as seed.
In bags, 20 cwt. stow in 50 feet.

TARTAR, or Tartaric Acid.—A substance deposited in wine casks during the fermentation of grape-juice. Has no objectionable qualities for stowage. Italian casks average 18 to 20 cwt. each, Marseilles and other casks of acid each 660 lbs.

20 cwt. should stow in 49 feet.

TEA.—*Flat Tea* is the highest class tea of all. For this tea the shrubs are usually kept shaded for three weeks before picking, so that the leaf is partly etiolated (bleached). The choicest leaves are selected before the manufacture is commenced. They are steamed, but never rolled, nor indeed touched by hand at all, but carefully turned by aid of a bamboo stick. After sufficient steaming they are simply dried. There is 30 per cent. more *theine* in etiolated leaves than in the leaves of the same plants grown in the light.

Japanese (not China) *green tea.*—The leaf is steamed in order to remove the raw flavour. It is then rolled and fire-dried, the two last processes being usually done together.

Chinese green tea.—In this, the leaf is roasted (while stirred with a stick) in an iron pan over a fire, then rolled a little, then roasted again, these processes being repeated even six or eight times, and the tea is then finally dried off.

The green tea manufacture is merely to dry the leaf; the black

tea manufacture alters materially its chemical constitution; the principal change is the remarkable diminution of the tannin.

Before loading a full cargo of tea the holds should be thoroughly cleaned out fore and aft, the limber boards all lifted and whitewashed. A little chloride of lime in water should be used to cleanse and sweeten the bilges. For outside steamers not employed regularly in the trade mix a quantity of cement and water together, and paint the ironwork of the holds with a light coating. When it is dry the holds may be whitewashed. If they have been well cleaned out in the first instance, the whitewashing will make them perfectly sweet and clean, but the cement wash will protect the ironwork from the corroding effects often ascribed to whitewash. Chinese stevedores cannot be surpassed in the proper stowage of tea cargoes; they thoroughly understand their work. A good stevedore will go into the holds and tell to within a few chests what the vessel will stow.

If ballast is necessary in carrying tea, shingle is preferred as being the cleanest and most easily handled. It is almost impossible to lay down any rule here for guidance as to quantity; every shipmaster will best understand the amount of D.W. required to make his vessel safe with a light cargo on board. Before he begins loading, however, this point should be decided beyond a doubt, for having once started it is impossible in most instances to rectify any mistake without serious expense and delay to all concerned. The holds should be kept well ventilated during the voyage. In fine weather a hatch should be taken off daily to allow any foul or heated air to escape.

Many merchants object to other goods being shipped with a cargo of tea. (*See* Tea Clause.) This is not to be wondered at, considering how easily it may be damaged. For instance, ship's stores in a room aft in the between decks have been known to damage part of a cargo, for which the owners were held liable. It is only when the shipment is all landed and examined that such damage is complained of, especially if the market price has fallen since shipment. An expert taster will detect (or at all events say he can detect) damage, and in most cases he is backed up by others who may be called in to decide the question. The utmost care should therefore be taken to prevent any disputes arising from such causes. In estimating what weight of tea a ship will carry, multiply the registered tonnage by 1,200 lbs. (about 10½ cwt.).

"Stevens on Stowage" says, with reference to sailing ships: "The hold should be well ventilated with windsails several days before receiving cargo. Vessels with large ventilators fitted forward

and aft are much approved; shippers prefer a vessel supplied with them, if she is in good order and well painted. Sometimes for the reception of tea the holds are whitewashed, which makes them light and sweet, but it causes the ironwork to rust. The iron should be painted red, and the woodwork scraped clean. The heavier the ballast the better; shingle is much approved, and about three-fourths of the whole are levelled over the keelson, even with it, or below it, as the case may be—the depth being regulated by a gauge to receive so many heights of chests between the beams and the ballast, which is first covered with half-inch fir."

The Chinese stevedores are not surpassed for good stowage in any part of the world, and the course usually observed by them at Canton with, say, a ship of 500 tons register, has been thus described: Tiers of chests are laid fore-and-aft, say five from side to side—amidships eight tiers. Take a set between the midship tiers and the end tiers, and set them up square and tight; then three or five tiers more, both amidships and aft, and set them up perfectly square from one wing to the other; if the tiers come in regularly up to the meeting of the chests of tea, they are dropped in by pairs, or what is termed "married," but if they require setting, the whole tiers are set upon and the last dropped in. This tier, when completed, is gauged in like manner as the ballast, from underneath the beams, to see they are perfectly level. Slips of wood are put on should there be the least hollow; and if any chest stands high it is lifted, and the ballast robbed to make the tier level; but should the deviation not exceed one-eighth of an inch, the mere jumping on the chest will do. The gauge is then lessened one tier, and it is carefully tried fore-and-aft to see there is no discrepancy. This method is pursued up to underneath the beams. When the deck beams are reached caution is necessary in order to make the stowage of the ship advantageous to the owner, as it is not always that chests are to be had to suit the filling close up to the upper deck—five-catty boxes being the least to fill up a space often 14 by 12 inches.

On rising from the ballast in the lower hold, close to the skin, from the fore shoulder to abreast the mainmast, it is necessary to keep the tea at least nine inches from the sides. Some gauges are in the form of a light square frame, others are formed like a capital T, but they are not so reliable as square frames on account of the occasional inequality of the hold beams, oak especially, the hollows of which might not be detected with T frames; sometimes a simple measuring rod is used, at others two half-rods, sliding gunter fashion.

When stowing the last chest in an early tier, a Chinaman, rather than strike it with any hard instrument, walks off to a distance, and

running back jumps into the air and falls in a sitting posture on the chest, which is thus sent uninjured into its place. Formerly when a tier was "commanded," and the screws used to gain an inch, the whole tier was sometimes crushed ; but if screws are used a plank is so placed as to take a whole tier, and prevent injury to any chest. Experienced stevedores are too correct in their measurements to require the frequent use of screws.

Tea exported from Canton or Macao is packed in cases (inside zinc leaf) measuring 2 to 3 feet, weight generally 15 lbs. net ; sometimes 20 lbs. net.

Tea Clause (Indian).—"The chests to be stowed in the cabins, or between deck. No sugar, safflower, rhubarb, India-rubber, rapeseed, hides, turmeric, drugs of any sort, or other cargo likely to create strong fumes, or cargo of a nature or tendency to injure the flavour of the tea, to be placed in the same compartment."

Size of chests landed at New York from India in 1891 :—

Chest 23 by 21 by 17 inches, about 5 ft. 2 ins., weight 113 lbs.

Half chest 21 by 18 by 16, about 3 ft. 6 ins., weight 90 lbs.

Quarter chest 13 by 14 by 14, about 1 ft. 6 ins., weight 24 lbs.

Ceylon chests 22 by 18 by 18, measure about 4 ft. 2 ins., weight 70 lbs.

Ditto 24 by 20 by 19, about 5 ft. 3 ins., weight 70 to 120 lbs.

Ditto 16 by 17 by 16, about 2 ft. 6 ins., weight 50 lbs. each.

China tea, in chests, 20 cwt. stow in 100 feet.

Half chest, 20 cwt. stow in 110 feet.

Indian and Ceylon tea, in cases, 20 cwt. will stow in about 100 feet.

TEA SHOOKS.—Bundles of small boards bound round with hoop-iron bands at each end, used for making tea boxes, etc.

Average measurement 5 ft. 8 ins. each, weight 163 lbs.

" " 6 ft. 4 ins. each, weight 220 lbs.

Average of 500 bundles of tea shooks, stowed 20 cwt. in 65 feet.

TEEL SEED.—The seed of the *Sesamum orientale*. In bags, 20 cwt. stow in 64 feet.

TERRA JAPONICA.—*See* **Cutch.**

THYME.—Bales average about 220 lbs. each. 20 cwt. should stow in 140 feet.

TIER.—A nautical way of describing a range of packages in the hold, viz., the ground tier or that near the keelson, second tier, third tier, etc.

TILES.—Roofing tiles in crates, 20 cwt. should stow in 85 feet.
Fire clay tiles in crates, 20 cwt. stow in 50 feet.
Retorts in bulk in 48 feet.

TIMBER.—Wooden sailing vessels will carry about 45 standards of spruce deals to the 100 tons register. Steamers will carry about 55 standards of same to the 100 tons net register ; when heavy deck loads are taken, about 5 per cent. more. (*See* **Deck Cargo.**)

Vessels constantly employed in the trade should be fitted with bow and stern ports, and be without permanently-laid 'tween decks. (*See* **Lumber.**)

Specific gravity, and weight per cubic foot of different Woods.

Timber.	Specific Gravity.	lbs. per c. ft.	*Timber.*	Specific Gravity.	lbs. per c. ft.
Ash, dry	845	52·81	Oak, dry	625	39·06
Beech, dry	69	43·12	Oak, green	1113	69·56
Cedar, dry	453	28·31	Pine	368	23·
Cedar, green	560	35·	Pitch Pine	936	58·5
Chestnut, dry	535	33·45	Sycamore, dry	590	36·87
Chestnut, green	875	54·68	Sycamore, green	645	40·31
Elm, dry	588	36·75	Walnut, dry	616	38·50
Elm, green	940	58·75	Walnut, green	920	57·50
Lignum Vitæ	1333	83·31	Willow, dry	486	30·37
Mahogany, dry	852	53·30	Willow, green	619	38·68
Maple	795	49·68			

Shipment of timber from Burmah requires small scantling for broken stowage, such as bundles of tea boards. Staves and railway pegs are often shipped for this purpose. Padouk or rough logs are objectionable, as they take up so much room and sometimes require 25 per cent. of broken stowage. Officers should be careful in receiving timber alongside to note such pieces as are marked "Dead Logs," for if they cast them adrift from the others until slung they will sink and be lost, in which case the ship will be liable.

It would be out of the question in such a short work as this to enter into a full description as to the different kinds of timber carried and the way in which it is stowed ; each country has its own peculiarities, and all ports where vessels are loaded are generally well supplied with experienced stevedores. Care should be taken to secure a good man, especially when loading for the first time. With his assistance and a seaman's knowledge and experience there is no fear of any serious mistake occurring in loading timber. (*See* **Deck Cargo.**)

20 cwt. of flooring boards should stow in about 75 feet.
Mahogany, 1 ton of 20 cwt. stows in 39 cubic feet.
Oak, 1 ton of 20 cwt. stows in 39 cubic feet.
Ash, 1 ton of 20 cwt. stows in 39 cubic feet.
Beech, 1 ton of 20 cwt. stows in 51 cubic feet.
Elm, 1 ton of 20 cwt. stows in 60 cubic feet.
Fir, 1 ton of 20 cwt. stows in 65 cubic feet.
Greenheart, 20 cwt. stows in 34 feet.
One load of Baltic squared fir should stow in 50 feet.
One load of North America squared fir should stow in 51 feet.
20 cwt. of deals or battens should stow in 50 feet.

TIMOTHY SEED.— *See* **Grass Seed.**

TOBACCO.—Ships loading full cargoes of either Kentucky or Virginia hogsheads require ballast or D.W. The loss of space in stowing the lower holds being great, many vessels require more ballast for such cargoes than for cotton. Raw or leaf tobacco is often shipped in bundles or bales, and this article requires plenty of ventilation when stowed; heat is said to detract from its quality and value. Raw tobacco, if stowed among other goods of a moist nature, will damage by sweat and mildew.

Several cases of spontaneous combustion are reported of vessels having cargoes of raw leaf tobacco, and it certainly is of a heating nature. Manufactured tobacco and cigars should not be stowed near moist or highly-scented articles. Masters and agents should be most careful in having all ship's papers, such as manifest, B. L., Custom House documents, Consul's certificates, etc., in order before the ship leaves the port of loading.

A shipmaster in the trade writes: "This is a cargo which you must be most particular about, if bound to Spanish or Italian ports. There should be no discrepancies in the manifest, and the correct weight of each hogshead or package must be given. Also when finished discharging, and previous to final search by Customs' Officers, make sure there are no loose leaves among the ballast. Should any be found a heavy fine will result."

Kentucky hogsheads weigh 1,700 lbs. each, measure 75 feet.
Kentucky tierces weigh 1,000 lbs., measure 50 feet.
Virginia hogsheads weigh 1,500 lbs., measure 60 feet.
Virginia tierces weigh 750 lbs., measure 40 feet each.
At Bahia 20 cwt. in rolls, or 40 cubic feet of cigars, go to one ton.
At Yokohama the bales average 250 to 270 lbs. each. 20 cwt. stow in 74 feet.

East Indian tobacco in bundles, about 60 lbs. each.
Turkish tobacco shipped in small bales. It is a choice article, and should be carefully stowed. 20 cwt. stow in about 150 feet.

TOMATO PASTE.—In casks 3 ft. 11 ins. by 2 ft. 5 ins. by 2 ft. 5 ins. measure 22 ft. 10 ins., weight about 780 lbs. each.
20 cwt. should stow in about 60 feet.

TONNAGE.—A cubic foot of distilled water weighing 62½ lbs. was assumed as a general standard for liquids. This cubic foot multiplied by 32 gives 2,000 as the original weight of a ton. Hence eight cubic feet of water makes a hogshead, and four hogsheads a ton in capacity and denomination, as well as weight. A ton equals 20 cwt., equal to 2,240 lbs.

A vessel should be so loaded as to carry her maximum tonnage; it should at the same time occupy the entire available space in her holds. When thus loaded there is a probability of realising the best freight. For example, it is desirable that a vessel capable of carrying 700 tons should be loaded with 700 tons of goods; if her hold has a space of 42,000 cubic feet, the goods engaged should be so apportioned as to occupy the entire space. In the above case for every ton of goods there is a space of 60 feet ($\frac{42000}{700}$), and if any description of goods, every ton of which occupies 60 feet, was engaged for it, the vessel with this kind of cargo should be loaded, and down to her marks.

But goods are of variable densities, in illustration of which it may be mentioned that whilst a ton of saltpetre occupies only 36 feet, a ton of ginger occupies 80 feet, and it is owing to this variation in the densities that it becomes difficult to assign the due proportion of each of the many kinds of export cargo that would serve in the aggregate to fill a vessel in the way referred to. If a vessel, say of the above tonnage and capacity, were required to be loaded with one kind of dead-weight and one kind of light freight, and if 35 and 80 feet were the cubic representatives of a ton of each, it would be apparent that 700 tons of the dead-weight freight would occupy only 24,500 feet, and leave 17,000 feet unoccupied, while, on the other hand, 700 tons of light freight would occupy fully 56,000 feet, or 14,000 feet more than her space. Consequently only a due proportion of each can occupy the entire space, and jointly weigh 700 tons.

To find the average space per ton in a vessel, divide the space in her hold by the tonnage she can carry.

From this average deduct the space per ton of dead-weight, multiply the remainder by the tonnage, and divide the product by

the difference between the space per ton of light freight and that of dead-weight.

The quotient is the amount of light freight wanted, and the difference between it and the tonnage the amount of dead-weight required to fill the holds and put the vessel down to her load-line.

Example.—Multiply the space per ton occupied by the light freight by the tonnage of the vessel, and subtract the product from the space in her hold. Divide the remainder by the difference of space occupied by a ton of each kind of cargo ; this gives the number of tons of light freight ; which subtracted from the tonnage of the vessel gives the number of tons for dead-weight.

Light freight space per ton.	80 c. ft.		35	
Dead-weight . . .	35		700	
Difference	45	subtract	24500	
		from	42000	
		45)17500	(389	tons nearly for
		135	700	light freight.
		400	311	tons nearly for
		360		dead-weight.
		400		
		405		

TONNAGE MEASUREMENT.—" Steyens on Stowage " contains considerable information on this subject. See also " Goodfellow's Calculator," for cubic contents of shipments of various dimensions.

TORTOISE-SHELL.—Packed in chests. A box containing one picul of Chinese tortoise-shell measures 9 feet. Stow as choice freight among other dry goods ; 20 cwt. in boxes should stow in about 155 cubic feet.

TOYS.—Boxes of bricks, dolls, battledores, carved animals, and Noah's arks, packed in cases ; 20 cwt. stow variously in from 150 to 500 feet.

TRAMWAY CARS.—Shipped from New York to India, 7 ft. by 7 ft. 9 ins. by 14 ft. 4 ins., about 777 ft. 7 ins. each. One car, boxed in, weighed 5,710 lbs., measured 778 feet.

TRAMWAY WHEELS.—Weigh 1,010 lbs., measure 39 cubic feet each. (Uncertain.) Shipped to Eastern parts generally.

TREFOIL.—*See* **Grass Seed.**

TURMERIC.—The root of the *curcuma longa*, imported from the East and used as a yellow dye. Bags weighing about 150 lbs. each,

small bags about 28 lbs. each, often shipped as broken stowage at a reduced freight. Quantities of dust often escape when working turmeric, to the injury of other goods. It has a strong odour, not unlike garlic. The principal season for shipment in the East Indies is during the N.E. Monsoon.

China bags average 133 lbs. each, measure 7 feet.

One ton of 20 cwt. stows in 65 to 80 feet.

TURPENTINE.—An oily spirit distilled from the resinous extract from trees. Requires great care in stowing, as it will damage other articles by its odour. The true turpentine tree grows in Spain and France, as well as in the island of Khio and the East. Common turpentine is prepared from different sorts of the pine, and is quite thick, white and opaque. The vapour is highly inflammable. Use no lights near it when stowing. Many kinds of cargo, such as tea, sugar, rice, coffee, flour, bread, and oilcake, will be rendered unfit for consumption when stowed near, even for a short passage. (*See* **Naphtha.**)

New York barrels 2 to 2½ cwt. ; 20 cwt. of turpentine in barrels should stow in 60 feet.

VALONA.—A species of acorn used by tanners. D.W. or ballast will be required with full cargoes. Being of a heating nature, it will injure casks of wine, etc., if stowed near. Vessels loading rolled valona carry 10 to 15 per cent. over their registered tonnage ; of unrolled valona about their registered tonnage only.

VANILLA (Ordinary) is obtained from the fruit (prepared unripe pods) of *Vanilla planifolia*, of the natural order *Orchidaceæ*, and it is curious to note that this is about the only orchid which has any economical or therapeutical use, although there are about 5,000 varieties.

VANILLA BEANS.—One of the most valuable cereals. Gathered by the natives in Mexico, they sell at £2 per 1,000. After being dried and cleaned they are worth £2 4s. per lb., and are used by druggists and confectioners. Packed in small boxes of 56 lbs. each ; they should be carefully stowed.

VARNISH.—Chinese varnish is the gum of the *Rhus vernicifera*. On this tree incisions are made ; the gum that runs out is collected in the dark, and strained through a cotton cloth. This operation can only be performed in the dark, as light spoils the gum and causes it to cake. It cannot be strained in wet weather, as moisture causes it to solidify. When the Chinese use the varnish they rub it

on with a sort of mop made of soft waste silk. It should only be used in wet weather, as, if the atmosphere is dry when it is rubbed on it will always be sticky. As used by the Chinese it takes about a month to dry, and during the time it is drying it is poisonous to the eyes.

Copal, oak, and other varnishes should be kept in iron drums, otherwise they will lose their value. When received as cargo it should be treated as oil or moist articles, and be kept apart from dry goods.

Packages of varnish measure 12 ins. by 12 ins. by 15 ins., about 1 ft. 3 ins.

VASELINE.—Packages containing this oily article should not be stowed among dry goods.

Cases measure 28 ins. by 28 ins. by 20 ins., about 9 ft. 1 in.

VEGETABLE WAX.—Largely-produced in Japan, often packed in boxes, 2 ft. 4 ins. by 18 ins. by 15 ins. deep, weight about 160 lbs.

VELLUM.—Should be kept dry and stowed carefully. In tin-lined cases. A roll contains about 60 skins.

VERDIGRIS.—Barrels average each 535 lbs. 20 cwt. stow in 57 feet.

VERMICELLI.—Macaroni, Semolina, and Italian pastes are manufactured from a hard variety of wheat, ground to a fine powder, then mixed into a stiff paste and squeezed through openings of various sizes. The nature and shape of the apertures determine the name of the product.

Treat as fine goods and stow among dry cargo only, away from any scented or moist articles. The heat and moisture from green fruit will seriously injure the quality of such goods.

Average weight of boxes 40 lbs. 20 cwt. should stow in 110 feet.

VERMILION, or CINNABAR.—The red sulphide of mercury. Is formed artificially by sublimating a mixture of six parts of mercury and one part of sulphur. It is then reduced to a very fine powder, thereby acquiring the beautiful bright colour peculiar to the pigment. The Chinese excel in the manufacture of this article. It is one of the most valuable paints usually carried on board ship. Care should be taken to stow it where it will be free from pressure or moisture.

Average of boxes of Vermilion, 2 feet each.

VINEGAR.—An acid made from liquors by undergoing the second fermentation. It should be stowed as moist cargo, such as lime-juice, claret, etc.

Puncheons contain	74 gallons.	Hogsheads contain	54 gallons.
Barrels ,,	36 ,,	Half Barrels ,,	27 ,,
Kilderkins ,,	18 ,,	Small casks ,,	12 ,,

VITRIOL.—The old chemical term for sulphate of iron, or green vitriol. Sulphuric acid is oil of vitriol. Sulphate of copper is blue vitriol. Sulphate of cobalt red vitriol. Sulphate of zinc white vitriol.

Oil of Vitriol is a dangerous article, and should not be carried as cargo under ordinary circumstances. Two jars are generally packed in one case with chalk, or whitening. In the event of a jar bursting it is advisable to throw the case overboard without opening it, otherwise the men handling it may be seriously burnt about the hands and feet. *See* **Acids.**

WALNUTS.—*See* **Nuts.**

WASH-BOARDS.—Packed in bundles containing one dozen each. Size 16 ins. by 14 ins. by 24 ins., measures 3 ft. 1 in. per bundle. Weight 47 lbs. each.

WASTE.—The refuse or partly manufactured thread of cotton. Small pods. Used for various purposes in machinery, etc. Generally packed in bales, bundles, or bags, and shipped only under inspection, and with a certificate from a competent surveyor as to its being free from oily matter.

Oily waste bales should not be received as general cargo, nor should it be stowed below with other goods, as it is liable to spontaneous combustion.

Bales of American cotton waste weigh 500 lbs., measure 37 feet each.

Bales of East Indian waste weigh 660 lbs., measure 50 feet.

WATER.—The supply of fresh water is a subject of great importance to all who live on shipboard. Far too little attention is generally paid to this important matter. The tanks on every vessel should be cleaned out and whitewashed at least once a voyage; oftener if possible. Where practicable, home water should be reserved in certain tanks for drinking in foreign ports, especially during the sickly season in hot climates. If this is not practicable, the water received at such ports should be purified as far as possible by having a fair proportion of Condy's Fluid or other disinfectant

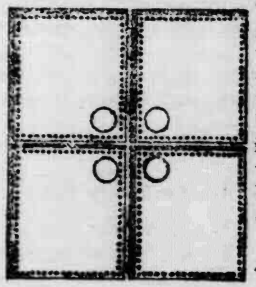
mixed with it. This can generally be accomplished through the sounding pipes or air-holes leading into every tank.

To Test Water for Putrescent Organic Matter, etc. :—Add to a tumbler full of the water to be examined one or two drops of Condy's Fluid (crimson preferred) *undiluted*, which will give it a very faint pink hue. If, after standing two or three hours, the pink colour has gone, or turned to yellowish, the water is tainted, and cannot be used safely in the state in which it is. If, on the contrary, the pink hue maintains itself, the water may be used. Filters in constant use should be well purified from time to time by a strong solution of the fluid being run through every part.

To render impure water sweet and safe to drink, and to ensure purity in Cisterns, Tanks, etc. :—For every fifty gallons of water pour into the cistern, water-butt, or ship's tank, one wineglassful of Condy's Fluid (crimson) *undiluted*. Stir thoroughly with a stick, and allow to stand several hours, or overnight. Unless the water be very foul, this quantity of Fluid will suffice to render it sweet. (*See* **Borax.**)

WATER-PROOF CLOTHING, Sheets, etc., containing oil or other preparations, such as India-rubber, Varnish, etc., are liable to spontaneous combustion, and should not be stowed below among general cargo. (*See* **Felt.**)

WATER-TANKS.—Should be stowed with the lids together, so that in clearing away to get at one tank you can get at four—see engraving. Tanks weigh $1\frac{1}{2}$ to 2 lbs. per gallon, and generally hold 400 to 700 gallons each, according to their shape, and occupy, pro rata, about half the space of casks. Should the water become discoloured through iron rust it is not injurious. In many cases water which seems undrinkable may be rendered sweet by the careful use of charcoal, or borax. (*See* **Borax.**)



A tank holding 600 gallons measures 4 ft. 1 in. by 4 ft. 1 in. by 6 ft.

A tank holding 400 gallons measures 4 ft. 1 in. by 4 ft. 1 in. by 4 ft. 1 in.

One gallon of fresh water weighs 10 lbs.

224 gallons of water weigh 20 cwt., or 1 ton.

20 cwt. salt water occupy 35 feet.

Water boils at 212° Fah.

Water freezes at 32° Fah.

WAX.—*See* **Beeswax.**

WHALEBONE.—Oil or grease is said to damage this article. (*See* **Oil.**)

Five tons of Whalebone, being the catch of the whaler "ECLIPSE," were recently sold in Dundee at £1,300 per ton, being the lowest price quoted for years, having regard to the fact that whalebone has brought as much as £2,650 per ton.

WHALE OIL.—The average full-grown Greenland whale yields about 15 tons of oil and 15 cwt. of whalebone, although the unusual quantities of 30 tons of oil and 30 cwt. of whalebone are sometimes obtained from one whale. The ordinary sperm whale yields about 10 tons of oil, and the average sized bottlenose whale yields 22 cwt. of oil, of which 5 per cent. is spermaceti.

WHEAT.—*See* **Grain.**

WHITENING.—In casks ; 20 cwt. should stow in 39 feet.

WHITE LEAD, BLACK LEAD, etc.—*See* **Paint.**

WINE and SPIRITS.—When in casks should be stowed bung up ; to have good cross beds at the quarters, to be well chocked with wood, and allowed to stow three heights of pipes or butts, four of puncheons, and 6 of hogsheads or half puncheons. The bilges of casks should be free below and from each other. (*See* **Casks.**) Stow beer, porter, wine, spirits, and liqueurs on the top of that part of the cargo not liable to damage.

Shipowners have often to pay heavy claims for shortages, notwithstanding every care to the contrary, especially with cases and barrels of bottled spirits. An officer should always be present when receiving or discharging such packages ; also a responsible person in the hold to see them safely stowed with a general cargo. Few mistakes or losses will occur if the vessel has a temporary portable room, or space bulkheaded off, in the between or orlop deck, into which all such packages can be put and safely locked up. The bulkhead could be made of loose planks or boards, and a door, etc., fitted, so as to unship when not wanted ; they would then be available for dunnage, and could be re-erected in an hour's time when required. (*See* **Ale and Beer.**)

Casks containing Whisky, 20 cwt. stow in 71 feet.

20 cwt. Spirits in cases stow in from $52\frac{1}{2}$ to 60 feet.

Barrels of Wine, each 715 lbs., 20 cwt. should stow in 86 feet.

Description and Contents of Wine Casks.

Description.	Contents.	Description.	Contents.
Cask of Lisbon - -	29 gallons.	Aum of Hock - -	31 gallons.
Hogs'd Burgundy - -	44 ,,	Quarter Cask of Port	28 ,,
,, Claret - -	46 ,,	,, ,, Sherry	27 ,,
,, Lisbon - -	58 ,,	Butt of Cadiz - -	108 ,,
,, Port - - -	57 ,,	,, of Sherry - -	108 ,,
,, Sherry - -	54 ,,	Vats of Sherry, 216 or 218 gallons, sometimes	250 ,,
Pipe of Cape - - -	92 ,,	Tun, four hhds. of 63 gallons, or two butts of 126 gallons - -	252 ,,
,, Lisbon or Bucellas	117 ,,		
,, Madeira - -	92 ,,	Admiralty white wine	
,, Malaga - -	105 ,,	,, hhd.	54 ,,
,, Marsala 92, some say	108 ,,	,, barrel	36 ,,
,, Port - - -	115 ,,	,, half-hhd.	25 ,,
,, Sherry, or Trent	93 ,,	,, kilderkin	18 ,,
,, Teneriffe, or Vidonia - -	100 ,,	,, small cask	10 ,,

Cases of Italian Wines, containing from 1 to 3 dozen bottles each, 20 cwt. stow in 85 feet.

Demijohns of Wine, in cases, 20 cwt. in 85 feet, when carefully packed, otherwise considerably more.

WINE LEES.—In bags of 216 lbs., 20 cwt. should stow in 78 feet.

WIRE.—Coils of Wire should be kept dry and free from uneven or heavy pressure during the voyage. The following table shows the test usually applied to Wire Rope of the ordinary description :—

GALVANIZED WIRE ROPE.

Six Strand.				Six Strand.			
Dia.	Per Fm.	Test.		Dia.	Per Fm.	Test.	
Ins.	lbs.	tons.	cwts.	Ins.	lbs.	tons.	cwts.
$\frac{1}{8}$	1	1	0	$1\frac{1}{8}$	11.14	15	6
$\frac{5}{16}$	1.57	1	11	$1\frac{3}{16}$	12.32	17	6
$\frac{1}{2}$	2.14	2	5	$1\frac{1}{4}$	14.44	19	6
$\frac{9}{16}$	2.82	3	5	$1\frac{3}{8}$	16.95	21	17
$\frac{5}{8}$	3.8	4	6	$1\frac{7}{16}$	18.69	24	8
$\frac{11}{16}$	4.52	6	7	$1\frac{1}{2}$	20.72	28	6
$\frac{13}{16}$	5.24	7	8	$1\frac{5}{8}$	22.4	32	5
$\frac{7}{8}$	6.72	8	11	$1\frac{3}{4}$	26.15	37	0
1	7.96	11	14	$1\frac{7}{8}$	32.45	50	0
$1\frac{1}{16}$	8.94	13	10				

WOOD.—Compiled by Capt. Walter Baxter, SS. "Bolivia" of St. John, N.B.

Standard, Spruce Deals, 165 cubic feet stow in 220 cubic feet, weigh $2\frac{3}{4}$ tons.

Standard, Birch Deals, 165 cubic feet stow in 230 cubic feet, weigh $4\frac{1}{4}$ tons.

Load, Birch Lumber, 50 cubic feet stow in 80 cubic feet, weigh $1\frac{1}{2}$ tons.

Floating Birch Lumber, 2,700 lbs. equal 40 cubic feet.
Sinking ,, ,, 3,000 lbs. equal 40 cubic feet.
Average ,, ,, 2,850 lbs. equal 40 cubic feet.
Longest ,, ,, 36 feet, average 16 by 16.
Shortest ,, ,, 10 ft. 6 ins., average 21 by 21.

12 to 14 per cent. may be added to measurements of Birch Lumber given here, as it will turn out at home ports that much additional by Customs' Calliper measurement.

125 standards of Spruce Deal, a good day's work.

80 standards of Birch Deals, a good day's work.

150 tons to 200 tons of Lumber would be a good day's work, everything working favourably.

Spruce Deals 10 to 26 feet for Liverpool cargoes.

Spruce Deals 10 to 30 feet for Glasgow cargoes. (*See* **Timber.**)

WOOD OIL.—In casks, 4 casks to a ton, weight per cask about 170 catties, value $30 per cask.

WOODWARE.—Tubs in nests measure 28 ins. by 25 ins. by 28 ins., about 10 ft. 2 ins.

WOOL.—Cargoes of pressed bales of wool, like cotton, require D.W. or ballast, which should be perfectly dry and levelled off fore-and-aft. The bands or fastenings of bales should not be cut loose when stowing, otherwise claims may be made for repacking at port of delivery. All ironwork or other parts of the holds likely to cause damage should be well matted, and the sides, as recommended in stowing jute, should be protected by dunnage. It is supposed that damp or oily wool will cause spontaneous combustion; hence it becomes necessary to ship dry wool only, unless under special circumstances, where it can be kept separate and easily got at. Screwing wool and cotton cargoes is fast going out of date, owing to the extra labour and expense attached to it; besides, the articles are now so well packed on shore by hydraulic presses that it becomes unnecessary to do it in the ship.

"Stevens" gives the following as the old plan usually adopted in sailing ships, having plenty of time to load:—"To make good stowage, it is necessary as each tier is being packed to use screws of different lengths, from 6 inches up to 4 feet, together with 'sampson posts' and 'trunk planks,' etc.; the planks are of hard wood 6 to 8 feet long, 9 inches broad, by 2½ or 3 inches thick, with a hole in the end; two, sometimes four, of these planks are inserted between any bales of a tier which are selected to be 'screwed off,' and placed, if only two are used, against the middle of their sides respectively; between them is entered a short screw, which when hove out is succeeded by others of greater length until the bales are forced sufficiently apart to admit of another being entered between the planks, and forced in by the aid of a screw 'set' against a sampson post. When the tier has been thus increased, by the additional bales, it becomes so tightened as to require two and eventually four screws to set the bales apart; in the latter case, four planks are so placed as to distribute the pressure equally against the 'trunk bales,' as the term is. The smooth surfaces of the planks materially assist the slipping of the bales, while they are being forced into their berth in the 'trunk way,' which gradually eases the screws and admits of their removal. When cargo such as wool has not been fixed (by screws or otherwise) sufficiently tight against the sides, the dunnage has subsequently slipped down by the motion of the ship at sea, and the goods have been injured by leakage, &c. On account of the high rate of wages at Sydney, stevedores will not 'screw off' now so willingly as they did formerly."

American wool in sacks weighs from 220 lbs. to 229 lbs., and measures from 30 ft. 4 ins. to 32 feet each.

20 cwt. wool in sheets stow in 260 feet.

20 cwt. of New Zealand wool, dumped, greasy, stow in about 84 cubic feet.

20 cwt. of New Zealand wool, scoured, stow in about 100 cubic feet.

20 cwt. of Australian undumped stow in about 236 cubic feet.

Cape of Good Hope bales of wool, 20 cwt. pressed, greasy, stow in 188 feet.

20 cwt. Cape of Good Hope bales of wool, pressed, scoured, stow in 280 feet.

Bales of Australian wool average 16 ft. 8 ins. to 17 ft. 3 ins. each, and weigh from 379 lbs. to 396 lbs. each; 20 cwt. should stow in 100 feet.

Double bales, 31 ft. 4 ins. to 33 ft. 5 ins. each, weigh from 654 lbs. to 687 lbs. each; 20 cwt. stow in 113 feet.

Mediterranean bales, unpressed, 200 lbs. each, 20 cwt. stow in 320 feet.

Mediterranean, etc., bales, half-pressed and corded, 20 cwt. should stow in 200 feet.

Spanish bales, unpressed, 176 lbs. each, 20 cwt. stow in 212 feet.

Bales, hydraulic pressed, 20 cwt. stow in 100 feet.

Bales of pressed wool waste, 20 cwt. stow in 75 feet.

YELLOW BERRIES.—In bales of 185 lbs. each. 20 cwt. should stow in 74 feet.

ZINC.—Usually packed in cylindrical rolls, and may be appreciably damaged by being pressed down by heavy cargo, or from bilge water.

Packed in cases 6 feet long by 2 feet in diameter.

ZINC WHITE.—*See* **Paints, etc.**

STEAM VESSELS.

APPROXIMATE WEIGHT OF ANCHORS, LENGTH AND SIZE OF CHAIN CABLES.

Vessel's Gross tonnage	Number of Anchors			Weight of Anchors			Length of Cables	Size of Cables
Tons	Bower	Stream	Kedge	Bower cwts.	Stream cwts.	Kedge cwts.	fathoms	inches
About 1000	3	1	1	22½	7	4	240	1⅝
,, 1500	3	1	1	26	8½	4½	240	1¾
,, 2000	3	1	1	31	10	5	240	1⅞
,, 3000	3	1	1	36	12	5½	270	1⅞
,, 4000	3	1	1	39	13	5½	270	2
,, 5000	3	1	1	42	14	6	270	2⅛
,, 6000	3	1	1	48	16½	7	270	2⅛
,, 7000	3	1	1	54½	19	8	270	2⅛

The anchor stock is usually one-third of the weight of the anchor.

The heaviest anchors for vessels at present in existence are those of the White Star Liner "Olympic," the bowers weighing 15 tons each, the cable being 3¾ inches.

THE END.

REDUCTION

RATIO

16:1

2.5 mm

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890

2.0 mm

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz1234567890

1.5 mm

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz1234567890

PM-MGP 13″x18″
METRIC GENERAL PURPOSE TARGET
PHOTOGRAPHIC

200 mm

150 mm

100 mm

A3

A4

A5

1.0 mm

1.5 mm

2.0 mm

2.5 mm

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890

PRECISION℠ RESOLUTION TARGETS

Century

A&D

1303 Geneva Avenue
St. Paul, MN 55119

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890

4.5 mm

3.5 mm

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz1234567890

3.0 mm

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz1234567890

London

Hamburg
to be transhipped at London

New York
to be transhipped at London

Glasgow

Official No.	86 709
Length	378 · 2
Breadth	40 · 2
Depth	28 · 6
Tonnage Gross	3551 · 13
" Nett	2319 · 31
Horse Power	480

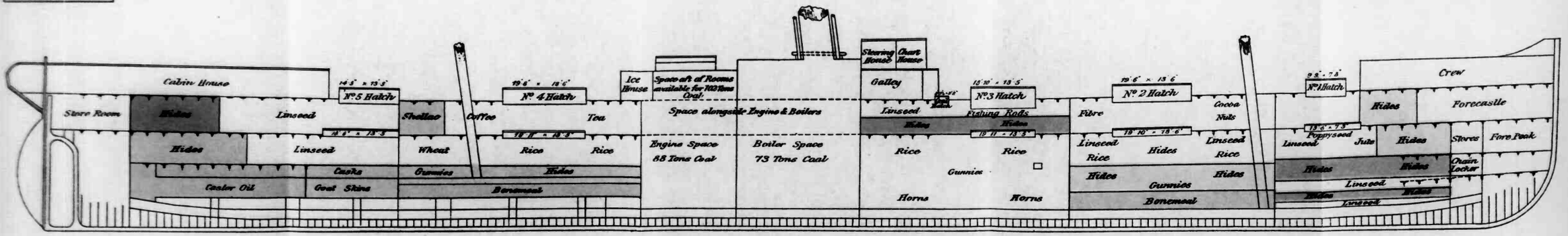
CARGO PLAN OF
S.S. "NUBIA."

Scale:

GROSS
SUMMARY OF HOLD CAPACITY

	TONS CARGO
No. 1 Hold	565
No. 1 Tween Decks	229
No. 2 Hold	918
No. 2 Tween Decks	359
No. 3 Hold	353
No. 3 Tween Decks	376
No. 4 Hold	976
No. 4 Tween Decks	424
No. 5 Hold	716
No. 5 Tween Decks	436
Space alongside E&B	239
Total	5650 Tons Cargo

Coal Bunkers proper 161 Tons
Space under Bridge available for 102 Tons



REDUCTION RATIO 12:1

2.0 mm ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz1234567890

1.5 mm ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz1234567890

PM-MGP 13″x18″
METRIC GENERAL PURPOSE TARGET
PHOTOGRAPHIC

150 mm

100 mm

1.0 mm

1.5 mm

2.0 mm

2.5 mm

A5

A4

PRECISION℠ RESOLUTION TARGETS

Century A&P

1303 Geneva Avenue
St. Paul, MN 55119

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890

4.5 mm

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz1234567890

3.5 mm

London

Glasgow

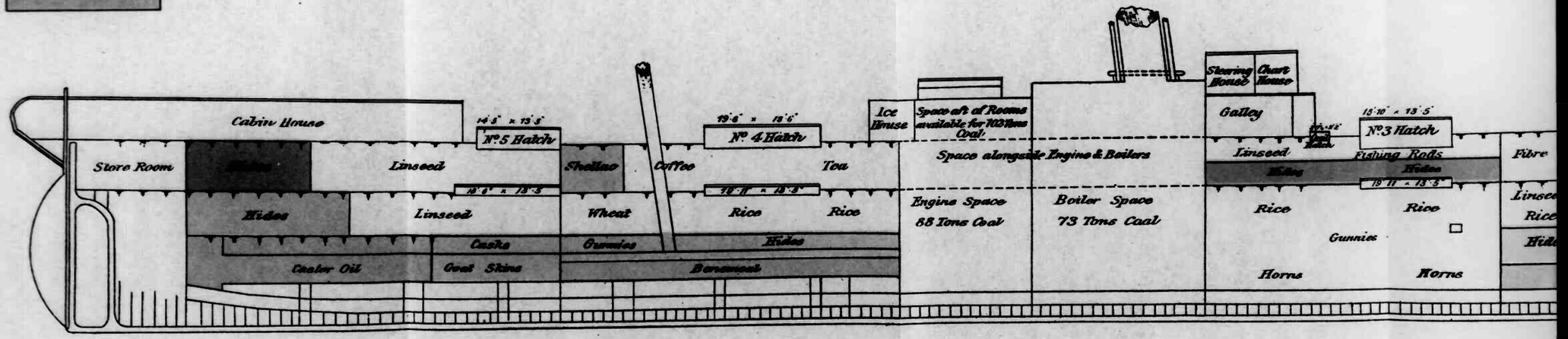
New York
to be transhipped
at London

Official N°.	86 709
Length	318 · 2
Breadth	40 · 2
Depth	26 · 6
Tonnage Gross	3551 · 13
" Nett	2319 · 31
Horse Power	480

CARGO PLAN OF

S.S. "NUBIA."

Scale:



CARGO PLAN OF
S.S. "NUBIA."

Scale:

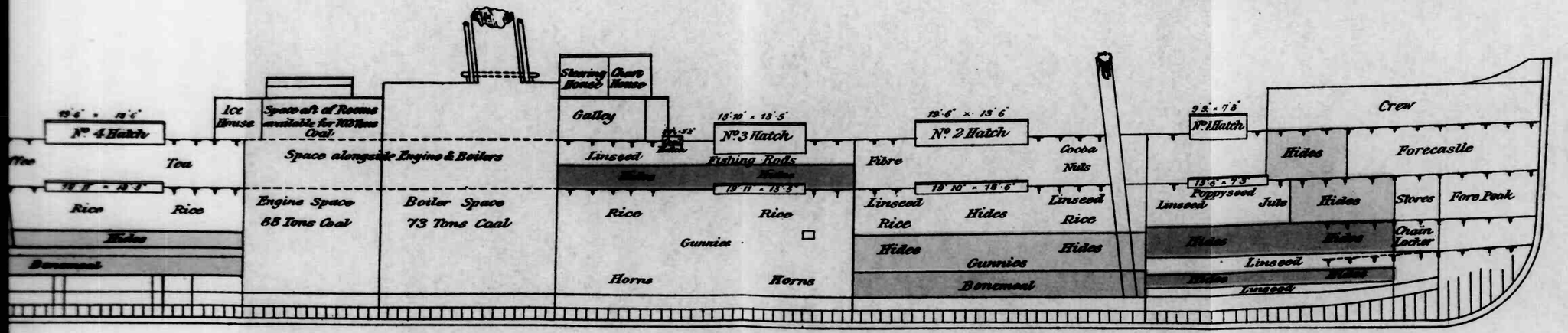
GROSS

SUMMARY OF HOLD CAPACITY

	TONS CARGO
No. 1 Hold	565
No. 1 Tween Decks	229
No. 2 Hold	918
No. 2 Tween Decks	339
No. 3 Hold	353
No. 3 Tween Decks	376
No. 4 Hold	976
No. 4 Tween Decks	424
No. 5 Hold	716
No. 5 Tween Decks	436
Space alongside E&B	239
Total 5650 Tons Cargo	

Coal Bunkers proper 161 Tons

Space under Bridge available for 102 Tons



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